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ABSTRACT

Designed to supplement the Agriscience Education for the Middle School curriculum guide, this instructional packet provides lessons to enable agriscience teachers to bring basic science concepts into the classroom through practical, hands-on activities and experiments. The course is designed to develop in sixth-grade students an awareness of the relationship between agriculture and science. It is divided into seven duty areas: becoming oriented to agriscience, describing agriscience, introducing plant and animal life cycles, communicating with others, introducing agricultural mechanics technology, introducing ecology and conservation, and identifying career opportunities in agriculture. An introductory sheet to each duty area lists competencies/tasks, two to seven lessons, and evaluation. Each lesson consists of any or all of these components: student objective; references; equipment, supplies, materials; presentation (introduction, motivation, discussion with questions and answers, other activities, conclusion, and evaluation); evaluation (test) with answer key; and handouts and worksheets. (YLB)

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Agriscience Education
for the Middle School

ED 407 501

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Instructional Units
Grade 6: Introduction to Agriscience

Virginia Department of Education
Office of Vocational, Adult, and Employment Training Services
Richmond, Virginia 23218-2060

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Agriscience Education for the Middle School

Instructional Units

Grade 6:
Introduction to Agriscience

Developed by
Virginia Department of Education
Office of Vocational, Adult, and Employment Training Services
PO Box 2120
Richmond, Virginia 23218-2120

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FOREWORD

This instructional packet is designed to supplement the Agriscience Education for the Middle School curriculum guide. Use of these lessons will allow agriscience teachers to bring basic science concepts into the classroom through practical, hands-on activities and experiments.

This instructional packet has been designed for maximum flexibility. Materials included in the packet serve as a foundation for agriscience instruction. The format of these lessons does not imply that the material should be taught in a particular way; the lessons are offered only as resources.

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AGRISCIENCE EDUCATION
GRADE 6: Introduction to Agriscience (8002)

- **Introduction to Agriscience (8002)**

  This course is designed to develop in middle school students an awareness of the relationship between agriculture and science. Major concepts covered in the course include an awareness of agriculture, the world of work, agribusiness careers, human relations, and scientific principles applied in agriculture. The course is offered on a semester or less basis for sixth-grade students.

- **Suggested Duty Areas**

Duty Area 0:	Becoming Oriented to Agriscience
Duty Area 1:	Describing Agriculture
Duty Area 2:	Introducing Plant and Animal Life Cycles
Duty Area 3:	Communicating with Others
Duty Area 4:	Introducing Agricultural Mechanics Technology
Duty Area 5:	Introducing Ecology and Conservation
Duty Area 6:	Identifying Career Opportunities in Agriculture

DUTY AREA 0: OVERVIEW
Becoming Oriented to Agriscience

- **Competencies/Tasks**
  - 0.1 Explore ideas associated with agriculture.
  - 0.2 Identify class rules and procedures.

- **Lessons**
  - 0.1 Ideas Associated with Agriculture
  - 0.2 Class Rules and Procedures
  - 0.3 Student Information Forms

- **Evaluation**

  Suggestions for evaluation appear at the end of each lesson. A sample quiz appears at the end of the duty area.

DUTY AREA 0
Becoming Oriented to Agriscience

Lesson 0.1 Ideas Associated with Agriculture

Student Objective

Explore ideas associated with agriculture.

References

Cooper, Elmer L. *Agriscience: Fundamentals and Applications.* Albany: Delmar, 1990.
Farm and Food Bytes: Introduction to Agriculture. Software. Stratford: Agricultural Education, 1988.
Food from Farm to You. Film. Peoria: Venard Films.
Virginia Agriculture in the Classroom. Richmond: Virginia Farm Bureau Federation.

Equipment, Supplies, Materials

computer
local *Yellow Pages* directories
16 mm movie projector

Presentation

A. Introduction
Agriculture encompasses a wide variety of activities, including plant and animal production, the harvesting and marketing of products, and genetic engineering. This lesson explores some of the activities and ideas associated with agriculture.

B. Motivation (select one)
1. Have students write down the ideas and activities they associate with the word *agriculture.*
2. Have students list what they had for supper the previous evening, then ask them to list the origin of each of the main ingredients of the food.

Suggested Activity: Make these exercises into games and award prizes to the winners.

C. Discussion

1. *Question: What are some examples of agricultural products and where do they come from?*

Answers:

Product	Origin
Milk	dairy cow
Bread	wheat, small grains
Hamburger	beef cow
Pizza sauce	tomatoes
Blue jeans	cotton
Baby lotion	soybeans
French fries	potatoes

Suggested Activity: *Virginia Agriculture in the Classroom* lists additional products. Using that list, have students create a poster illustrating various agricultural products.

2. *Question: What types of local businesses are associated with or dependent upon agriculture?*

Answers: grocery stores
florists
hardware stores
machinery dealers
lumber yards
trucking businesses

Suggested Activity: Have students use the *Yellow Pages* to look up names of local businesses that they think are related to agriculture, and have them explain this relationship.

3. *Question: What are the four major areas within the agricultural industry?*

Answer: Production: farmers producing food
Processing: changing food and fiber into usable products
Distribution: moving products to the market
Marketing: the selling of products

Suggested Activity: Have students choose an agricultural product and explain how that product gets from the farm to their homes. Require students to be specific about the actual processes involved. If necessary, give an example first.

4. *Question: What is the relationship between agriculture and science?*

Answer: Agriculture is the application of the earth, physical, and life sciences. Earth science is the study of soils and sunlight; physical science is the study of energy and electricity; life science is the study of plants, animals, and conservation.

D. Other Activities

1. Show the film *Food from Farm to You.*
2. Have students use the software package *Farm and Food Bytes: Introduction to Agriculture.*

E. Conclusion

Agriculture is more than just farming: it includes all the processes involved in getting food and fiber from the farm to the home. The following lessons will explore the connection between agriculture and various areas of science.

F. Evaluation

Lesson 0.2 Class Rules and Procedures

Student Objective

Identify class rules and procedures.

References

Burke, Stanley R., and T. J. Wakeman. *Modern Agricultural Mechanics.* Danville: Interstate, 1992.

Cooper, Elmer L. *Agricultural Mechanics: Fundamentals and Applications.* Albany: Delmar, 1987.

Equipment, Supplies, Materials

copies of the school and student handbooks

Presentation

A. Review

The first lesson explored some of the ideas associated with agriculture. This lesson covers procedures and rules for the classroom.

B. Motivation

Ask students to explain the necessity of classroom rules and procedures. Explore what would happen if there were no rules or procedures.

C. Discussion

1. *Question: What rules should be established for this class?*

   Answers:
   - Come prepared: bring a pencil and an agricultural notebook to class each day.
   - Be in seats when the tardy bell rings.
   - Do not chew gum or eat food.
   - Raise hand for permission to speak.
   - Be polite and courteous.
   - Show respect for others.
   - Do not sharpen pencils during class.
   - Do not leave the classroom or laboratory area without permission.

   These are some basic rules for a classroom; specific rules may vary based on school division policies. Read each rule, discuss its importance, and make sure each student understands its meaning.

2. *Question: Which classroom procedures will be followed in this class?*
   Answers:
   - roll call
   - administrative and departmental announcements
   - review of previous class materials
   - announcement of student objectives for the day
   - presentation of class or laboratory materials
   - review of class materials or laboratory cleanup
   - dismissal by the teacher

   The teacher may add additional procedures.

3. *Question: What is the grading policy?*
   Answer: Suggested grading policy:

Quizzes	10%
Agricultural notebook	15%
Tests	35%
Projects (classroom and lab)	35%
Homework	5%

   Explain why different percentages are assigned to different activities. If appropriate, let students set the grading scale. If students do not receive letter grades, alter the policy as required.

D. Other Activities
   Use Lesson 0.3 to collect student information.

E. Conclusion
   Review classroom rules and grading policy.

F. Evaluation
   A sample test is provided at the end of this duty area.

Lesson 0.3 Student Information Forms

Student Objective

Complete an information sheet.

Equipment, Supplies, Materials

information sheet (6VA 0.1)
file folder
index cards

Presentation

A. Introduction
People who work together normally have some basic information about each other. Information forms are one way to collect this information.

B. Motivation
Have students list different ways to contact people and how the information needed to do so is found, e.g., telephone books, organization directories, school files, address books. Discuss how the information form might be used.

C. Assignment
1. Have students purchase a file folder and place their name on the file tab, last name first. Place the student information sheet inside the folder.
2. Instruct students to complete the information sheet neatly (6VA 0.1). It may also be helpful for the teacher to read each question on the form aloud.

D. Other Activities
Information about students and their schedules can be placed on index cards and stored in a file box for the teacher to use at home.

E. Conclusion
Explain what will be done with these information sheets. Example: These information sheets will be kept on file in this department.

F. Evaluation
Grade students on their ability to complete the form accurately.

Duty Area 0 Evaluation
Becoming Oriented to Agriscience

Name_____

Date _____

I. True or False: circle the correct letter.

T F 1. The milk we drink comes from a beef cow.
T F 2. Hamburger is a product from a hog.
T F 3. A lumber yard depends upon agriculture.
T F 4. Changing food and fiber into usable products is called processing.
T F 5. Agriculture can be defined simply as farming.
T F 6. Science and agriculture are closely related.
T F 7. Bread comes from wheat or other small grains.
T F 8. A florist's shop depends upon agriculture.
T F 9. Distribution involves moving agricultural products to the market.
T F 10. The process of producing food is called *production.*

II. Matching: in the right-hand column, find the best match for each of the words in the left-hand column, then write the letter for your answer in the blank.

11. _____	Pizza sauce	A	Products
12. _____	Cotton	B.	French fries
13. _____	Potatoes	C.	Soybeans
14. _____	Processing	D.	Tomatoes
15. _____	Baby lotion	E.	Blue jeans

III. Short Answer: write your answer in the space below the question.

16. Name four businesses in the community that are associated with or dependent upon agriculture.

_____ _____

_____ _____

17. List three examples of how agriculture and science are related.

_____

_____

_____

18. Select an agricultural product and explain or draw how it gets from the farm to the store. Match the steps your product goes through with the steps of production, processing, distribution, and marketing.

19. Why is it necessary to have rules?

20. List five rules of this class.

_____

_____

_____

_____

_____

Duty Area 0 Evaluation Answer Key

1. F
2. F
3. T
4. T
5. F
6. T
7. T
8. T
9. T
10. T
11. D
12. E
13. B
14. A
15. C
16. Answers will vary.
17. Answers will vary.
18. Answers will vary.
19. Answers will vary.
20. Answers will vary.

Student Information

Class Period _____

Name _____ Age _____ Sex _____
Last First Middle

Address _____
Rt., Box #, Apt., Street Town State Zip

Phone number _____ Date of Birth _____ Grade in School _____

Social Security Number _____ Bus number _____ Load _____

Name of Parents or Guardians _____

Address of Parents _____
(If different from yours)

Occupation of Parents: Father: _____ Phone: _____
Mother: _____ Phone: _____

Number in family _____ Brothers _____ Sisters _____

Do you live on a farm? _____ If yes, how many acres? _____

What is raised or grown? _____

If you do not live on a farm, do you have access to a farm? _____

Do you have garden space? _____ workshop space? _____

space for an animal? _____ hobbies? _____

Class Schedule

Period	Subject	Teacher	Room
Homeroom			
1			
2			
3			
4			
5			
6			
7			

On the back of this sheet, give directions to your house by drawing a map or listing them step-by-step.

DUTY AREA 1: OVERVIEW
Describing Agriscience

- **Competencies/Tasks**
  - 1.1 Define *agriculture* and *agriscience*.
  - 1.2 Discuss the impact of agriculture on the world economy.
  - 1.3 Identify the key factors that have shaped the agricultural industry in the United States.
  - 1.4 Describe the interdependency of agriculture and other segments of society.
  - 1.5 Identify current research and development activities in agriculture.

- **Lessons**
  - 1.1 Defining *Agriculture* and *Agriscience*
  - 1.2 The Impact of Agriculture on the World Economy
  - 1.3 Key Factors in the U.S. Agricultural Industry
  - 1.4 The Interdependence of Agriculture and Other Segments of Society
  - 1.5 Current Research and Development in Agriculture

- **Evaluation**

  Suggestions for evaluation appear at the end of each lesson. Sample quizzes appear at the end of the duty area.

DUTY AREA 1
Describing Agriscience

Lesson 1.1 Defining Agriculture and Agriscience

Student Objectives

1. Define *agriculture.*
2. Describe the differences and similarities between *agriculture* and *agriscience.*
3. List five examples of agriculture or agriscience businesses found in Virginia.
4. List five major crops grown in Virginia.

References

BAS: Introduction to Agriculture Slide Set With Script. Slides. Ithaca: Instructional Materials Service, Cornell.

Cooper, Elmer L. *Agriscience: Fundamentals and Applications.* Albany: Delmar, 1990.

FFA Video Collection. Video. Alexandria: National FFA Organization.

Virginia Agriculture in the Classroom. Richmond: Virginia Farm Bureau, 1990.

Equipment, Supplies, Materials

slide projector
TV/VCR
overhead projector
transparency masters and worksheets (6VA1.1-1.6)

Presentation

A. Introduction

This lesson defines agriculture and highlights its importance in daily life. To introduce the lesson, ask students to imagine life without food, clothing, or shelter. It is the agriculture industry that produces much of what humans need to survive. Agriculture includes not only growing the raw materials needed but also the various processing required to make these raw materials usable.

B. Motivation (select one)

1. Show the *Introduction to Agriculture Slide Set.* Complete worksheet 6VA 1.1.
2. Use pictures to show various jobs within the agriculture industry.
3. List on the board the associations students have with the word *agriculture.*

4. Use the public service announcement tracks on the *FFA Video Collection* tape to discuss all of the activities encompassed by the term *agriculture*.
5. To emphasize the importance of agriculture to daily life, have students identify the materials in the clothes they are wearing and the ingredients of their favorite foods.

C. Assignment

1. Have students read the definition of *agriculture* (6VA 1.2). Highlight the different components of agriculture.
2. Develop a collage using the theme, "The Many Faces of Agriculture."
3. Have students complete the agricultural production word search (6VA 1.3) and discuss the meaning of each of the terms.

D. Discussion

1. *Question: How does agriculture relate to other industries?*
   Answer: After viewing the *Introduction to Agriculture Slide Set*, identify and discuss the examples of agricultural products, related industries, and new technologies found in Virginia and the United States (6VA 1.1).

2. *Question: How does agriculture affect us?*
   Answer: Use one of the topics suggested in the *Motivation* section above to discuss the diversity of agriculture and its importance in our lives.

3. *Question: What is the difference between* agriculture *and* agriscience?
   Answer: *Agriculture* encompasses all of the activities involved in the production, processing, distribution, and marketing of food and fiber products; *agriscience* is the application of scientific principles and new technologies to agriculture.

4. *Question: What are natural fibers used for?*
   Answer: Use sheets 6VA 1.4 and 1.5 to discuss the sources and uses of various fiber products.

E. Other Activities
   1. Use another item from the *Motivation* section to provide examples of the various activities included in the term *agriculture*.
   2. Tour a local farm or agribusiness to observe firsthand the activities involved in agriculture.

F. Conclusion
   Agriculture and agriscience play an important role in modern life because much of what is eaten, worn, and used is produced by the agriculture industry. Agriscience, which is the application of scientific principles and new technologies to agriculture, develops new processes and methods to create better products for the future.

G. Evaluation
   A quiz (6VA 1.6) for use with the *Introduction to Agriculture Slide Set* is included at the end of this duty area.

Lesson 1.2 The Impact of Agriculture on the World Economy

Student Objectives

1. Define *import* and *export*.
2. Identify countries that receive Virginia's agricultural exports.
3. List five products exported from Virginia.
4. Identify where some fibers and foods are produced and processed in Virginia, the United States, and the world.

References

Cooper, Elmer L. *Agricultural Mechanics: Fundamentals and Applications*. Albany: Delmar, 1990.

Virginia Agriculture in the Classroom. Richmond: Virginia Farm Bureau, 1990.

Equipment, Supplies, Materials

overhead projector
transparency masters and worksheets (6VA 1.7-1.12)

Presentation

A. Introduction

The previous lesson identified some of the activities included in *agriculture*. This lesson discusses where various products are made and the effects these products have on people in different countries.

B. Motivation (select one)

1. On a United States or world map, list products students associate with specific countries or states.

   Examples:
   Idaho .....potatoes
   Washington.....apples
   Florida .....citrus
   Switzerland ....Swiss cheese
   France .....wines
   Japan.....electronics
   Germany .....beer or cars

2. Use the currency worksheet (6VA 1.7) to introduce the currency of various countries and exchange rates. Discuss how exchange rates affect import and export costs.

C. Assignment
Ask each student to select one country or state, identify its major agricultural products and exports, and present this information to the class.

D. Discussion
1. *Question: What does* import *mean?*
Answer: *Import* means bringing products into one country or state from another country or state.

2. *Question: What does* export *mean?*
Answer: *Export* means shipping products out of one country or state for sale in another country or state.

3. *Question: How do the products of one country affect other countries?*
Answer: Collect the results of the assignment and use that information to discuss the impact of one country's products on another country.
Examples:
   - Japan imports much of its food and exports electronics. The U.S. exports food to Japan and imports electronic products from them.
   - Idaho grows a lot of potatoes, but not as many apples or oranges. They sell potatoes to Washington and Florida and buy apples from Washington and oranges from Florida.

E. Other Activities
Use overhead transparencies 6VA 1.9-1.12 to discuss Virginia's exports.

F. Conclusion
Agricultural products are an important source of income for many countries: countries sell whatever they have too much of and buy products they cannot produce themselves.

G. Evaluation
On a world map, have students draw lines from an export country to an import country, and write the products that are traded on the line.

Lesson 1.3 Key Factors in the U.S. Agriculture Industry

Student Objective

Identify the five factors that shape the U.S. agricultural industry:

- land resources
- diverse climates
- good transportation system
- strong markets
- inventions (technology/adaptability)

References

Cooper, Elmer L. *Agriscience: Fundamentals and Applications.* Albany: Delmar, 1990.

Presentation

A. Introduction

America is the leading agricultural producer in the world. This lesson discusses the five factors that have helped America stay in the forefront of world agriculture.

B. Motivation

Ask students to list the factors they think enable the United States to produce the volume of food that it does.

C. Discussion

1. *Question: How do land, climate, transportation, markets, and ingenuity affect agricultural production?*

   Answer: Take the list developed in the *Motivation* section, and group those items into the five major factors that shape the agricultural industry. America is a major agricultural producer because it is strong in all five of these areas. Some countries are weaker in one or two areas, so their total volume of agricultural production is less than that of the U.S. Some countries are lacking in most of the five areas, so they must buy most of their food and fiber products.

   - **Land resources:** A large amount of fertile land is available in the U.S.
   - **Diverse climates:** The different climates across the U.S. allow us to grow many types of plants and animals.
   - **Transportation:** Good road, rail, air, and boat transportation get the product to market quickly and cheaply.
   - **Strong markets:** A large base of domestic and global markets and a low cost of production makes agriculture a profitable business.

- **Inventions:** All areas of agriculture are developing alternative ways of working with food and fiber products. New ideas decrease the costs of production or increase the value of the products. Much of the new technology in food and fiber production was invented in the United States.

D. Other Activities
This lesson can also be taught by incorporating the information into other duty areas as suggested below.

Factors	Duty Area	Lesson
Land resources	#2 Plant cycles	2.2 Discuss the importance of soil to plant yield; fertile soil is a strength of U.S. agriculture.
Diverse climate	#2 Plant cycles	2.2 Climate is an essential component of plant growth. The diverse climate in the U.S. allows for great diversity in the crops that can be grown.
Transportation	#1 Describing Agriculture	1.4 Products must be transported to various markets efficiently. Without a strong transportation system, U.S. agriculture could not have grown to the size it is today.
Strong markets	#1 Describing Agriculture	1.2 The low cost of production in the U.S. creates large domestic and global markets. These strong markets are a strength of U.S. agriculture.
Inventions	#1 Describing Agriculture	1.5 All areas of agriculture are developing new ways of working with agricultural products. These new ideas decrease the cost of production or increase the value of the products. These new ideas have helped the U.S. become the agricultural producer it is today.

E. Conclusion

The U.S. is a global competitor in agriculture because it is strong in each of the five major factors necessary to produce high quality products in a low cost, efficient manner and then get those products to market. Because of these strengths, the U.S. will continue to be a strong agricultural producer in the future.

F. Evaluation

Students may be evaluated on a project focused on one of the five major factors that have shaped the agricultural industry.

Lesson 1.4 The Interdependence of Agriculture and Other Segments of Society

Student Objectives

1. Trace the flow of an agricultural product from the farm to the table.
2. Describe how the money a consumer spends on food is distributed to the various people involved in producing, processing, and distributing it.
3. Explain the process used to make a harvested raw material into a consumer-ready product (e.g., making cheese).

References

Cheesemaking Kit. Mansfield: Frey Scientific.
Cooper, Elmer L. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.
Food for America. Video. Alexandria: National FFA Organization.
The Case of the Sneaky Snack. Video. Alexandria: National FFA Organization.
Virginia Agriculture in the Classroom. Richmond: Virginia Farm Bureau, 1990.

Equipment, Supplies, Materials

overhead projector
TV/VCR
transparency masters and worksheets (6VA 1.13-1.15)

Presentation

A. Introduction

Previous lessons have identified some of the activities included in agriculture and have discussed agriculture's impact on the world. This lesson examines the processing needed to change a freshly harvested product into an item ready for purchase by a consumer. The processing of agricultural products has an impact on local communities, the country as a whole, and the world.

B. Motivation (select one)

1. Have each student bring in an empty package from a favorite food item and use these packages to discuss the processing involved in changing raw materials into usable items.
2. Use the video *The Case of the Sneaky Snack* to show how much processing is needed for some food products (6VA 1.13).
3. Show the video *Food for America*.

C. Assignment
Have students complete the "Food for America Word Search Worksheet" found in the *Food for America* packet.

D. Discussion
1. *Question: What is the process of marketing food products?*
Answer: Discuss the flow of products from farm to table and the jobs involved in this process.

Agricultural Processing

At the Farm:	**Transportation of Products by:**
maintain cleanliness	train
harvest the product	truck
store product properly	plane
prepare product for transport	ship
At the Processing Plant:	**Functions of Processing:**
inspect product	control quality of products
grade product	preserve products
package product	add nutrients
store product	make more useful products

2. *Question: What is the relationship between the cost of an item on the market and the costs associated with producing the item?*
Answer: Discuss the costs involved in changing raw materials into final products and how the price of a product at the market is distributed among the various people involved in producing it (6VA 1.14).

E. Other Activities
1. Have students make a food product, such as cottage cheese, to help them understand the processing necessary for some foods.
2. Visit a local food processing center, e.g., a milk plant, an apple processing plant, a canning plant.

F. Conclusion
The development of agricultural products involves a large number of people and industries. Many people in different jobs must work together to get a product from the farm to the table.

G. Evaluation
An "Agricultural Processing Quiz" (6VA 1.15) appears at the end of this duty area. Students may also be evaluated on making a food product.

Lesson 1.5 Current Research and Development in Agriculture

Student Objectives

1. Identify four current areas of research in agriculture.
2. Identify four past advances in agriculture and explain their importance today.

References

Cooper, Elmer L. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.

Equipment, Supplies, Materials

ultra-high-temperature milk
articles from magazines or newspapers

Presentation

A. Introduction
Earlier lessons defined agriscience as the application of scientific principles to agriculture. New methods are being developed in all areas of agriculture, from production to transportation to storage and processing. This lesson examines some of the current developments in agriculture used to create food and products.

B. Motivation (select one)
1. Bring in a sample of ultra-high-temperature processed milk. Discuss the benefits of an extended shelf life without refrigeration. Introduce the concepts of pasteurization and homogenization as processing components.
2. Invite a veterinarian or A.I. technician to discuss embryo transfer or artificial insemination.
3. Visit a nursery or invite a grafting specialist to demonstrate a bud, T, or whip graft.

C. Assignment
Have students select and read an article about a new agricultural technology and write a short report describing the new idea. Have them present this information to the class.

D. Discussion

1. *Question: What are some major research developments in agriculture?*
   Answer: Use the student reports from the *Assignment* section to explain various areas of research and development in agriculture. Many of these areas are related to an earlier discovery or invention that is now commonplace in agriculture.

   Examples of new technology based on older discoveries:
   - Embryo transfer relies upon the prior development of artificial insemination.
   - Laser-guided tilling systems are based on the prior development of clay-tilling systems.
   - Controlled-atmosphere storage of apples requires an understanding of how apples respire as they ripen.

E. Other Activities
Develop a timeline identifying major advances in agriculture.

F. Conclusion
The agricultural industry is constantly changing. Past discoveries lead to new discoveries, and as these new discoveries make production and distribution more efficient, fewer farmers can feed more consumers around the world.

G. Evaluation
Evaluate the written and oral reports on new technology.

Introduction to Agriculture Slide Set Worksheet

Name_____

Date _____

During the slide presentation:

1. List the different types of agricultural production shown:

_____ _____

_____ _____

_____ _____

_____ _____

2. Name a change in technology that took place between the time represented in the first few slides and the time represented in the middle group of slides.

_____

_____

3. List the jobs in agriculture, other than farming itself, that are shown in the slides.

_____ _____

_____ _____

_____ _____

_____ _____

A Definition of Agriculture

AGRICULTURE: a broad-based industry that includes

- the farmers that grow plants or animals for food and fiber
- the businesses that supply materials or services to the farmers
- the businesses that turn the farmer's goods into finished products, which are then advertised and sold worldwide
- the research and development of new technology to feed people and animals better

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Agricultural Production Word Search

V M D P F I M H E L N N M B V Z Z X F T Q
E G G S I J W U P F A P O U L T R Y M Y V
G A S X E V D L N H I B M T S S I Y V Q L
E Y B S L R Z H P Y K S O E H H R P C S M
T M K E D H I P O D P Q H R A I R N H R L
A Q U A C U L T U R E A T I O N A L
B Y D F R Z A B S O T B Z D R T G N O J F
L L G O O Y P N I P F I V B V I O U I M H
E H G O P K R M U O E E C O V F E R N Q S
S S A D S A M R V N B C W U J F G S Y M U
M T R F W O Y I B I X J I E L V P E I G Z
D A O S O S U W K C N T C A Z T B R L L Q
T F R I E R V H B S A E N G L R U Y Z G X
G O Y L I V E S T O C K Y D E T L R D O Q
E R P Z S T G S J I E A A A X O Y Q E E R
U A A M G M M Y T E X T Z H R T L W X D M
M G U I V V C B H R Q D A E X D T D P T R
T E M X N F Z O F G Y W Y Z S W S F I B Y

Can you find these words?

RECREATIONAL
AQUACULTURE
FIELD CROPS
FISHERIES
VINEYARDS
NURSERY
GRAIN
MEAT
HORTICULTURE
SPECIALTY
LABORATORY
MUSHROOMS
FORESTRY
SEAFOOD
DAIRY
HYDROPONICS
MAPLE SYRUP
VEGETABLES
LIVESTOCK
POULTRY
FORAGE
EGGS

Word Search Answer Key

V . . . F . . . . L . . M . . . .
E G G S I . . . . F A P O U L T R Y . . .
G . . . E . . . . H I B M . S . . Y . . .
E . . S L . . H . Y . S O E . H R . . . .
T . . E D . . . O D . . H R A I R . . . .
A Q U A C U L T U R E C R E A T I O N A L
B . . F R . . . S O T . . D R T . O . . .
L . . O O . . . . P . I . . . I O U . M .
E . . O P . . . U O E . C . . . E R . . S
S . . D S . . R V N . C . U . . . S Y . .
. . . F . . Y . . I . . I . L . . E . . .
. . . . O S . . . C N . . A . T . R . . .
. F . . E R . . . S . E . . L . U Y . . .
G O . L I V E S T O C K Y . . T . R . . .
. R P . . . . S . . . . . A . . Y . E . .
. A A . . . . . T . . . . . R . . . . . .
M G . I . . . . . R . . . . . D . . . . .
. E . . N . . . . . Y . . . . . S . . . .

Natural Fibers

Fiber	Origin	Common Uses
Cotton	Seed pod of cotton plant	Jeans, sheets, shirts, dresses, towels
Wool	Sheep, goats	Coats, sweaters, blankets, jackets, carpets, suits
Silk	Cocoon of silk worm	Shirts, blouses, ties, dresses, suits, robes
Linen	Stalk of flax plant	Suits, skirts, dresses, tablecloths

Synthetic Fibers

Fiber	Origin	Common Uses
Rayon	Manufactured from cellulose of trees	Clothing and household items
Nylon	Manufactured	Sportswear, rainwear, jackets, hosiery, carpeting, tents
Acrylic	Manufactured	Sweaters, carpeting, suits, blankets, knitted clothes
Polyester	Manufactured	suits, skirts, dresses, tablecloths

Introduction to Agriculture Quiz

Name_____

Date _____

1. Define *agriculture* in your own words.

2. List five major crops grown in Virginia.

   _____

   _____

   _____

   _____

   _____

3. List five enterprises or businesses in Virginia that are related to agriculture.

   _____

   _____

   _____

   _____

   _____

Foreign Currencies Worksheet

Name_____

Date _____

Directions: Match the countries in the list below with the appropriate standard of currency.

	Country	Currency
_____	1. Canada	A. Pound
_____	2. France	B. Ruble
_____	3. Japan	C. Franc
_____	4. England	D. Dollar
_____	5. Germany	E. Mark
_____	6. Russian Republics	F. Yen
_____	7. United States	G. Peso
_____	8. Mexico	

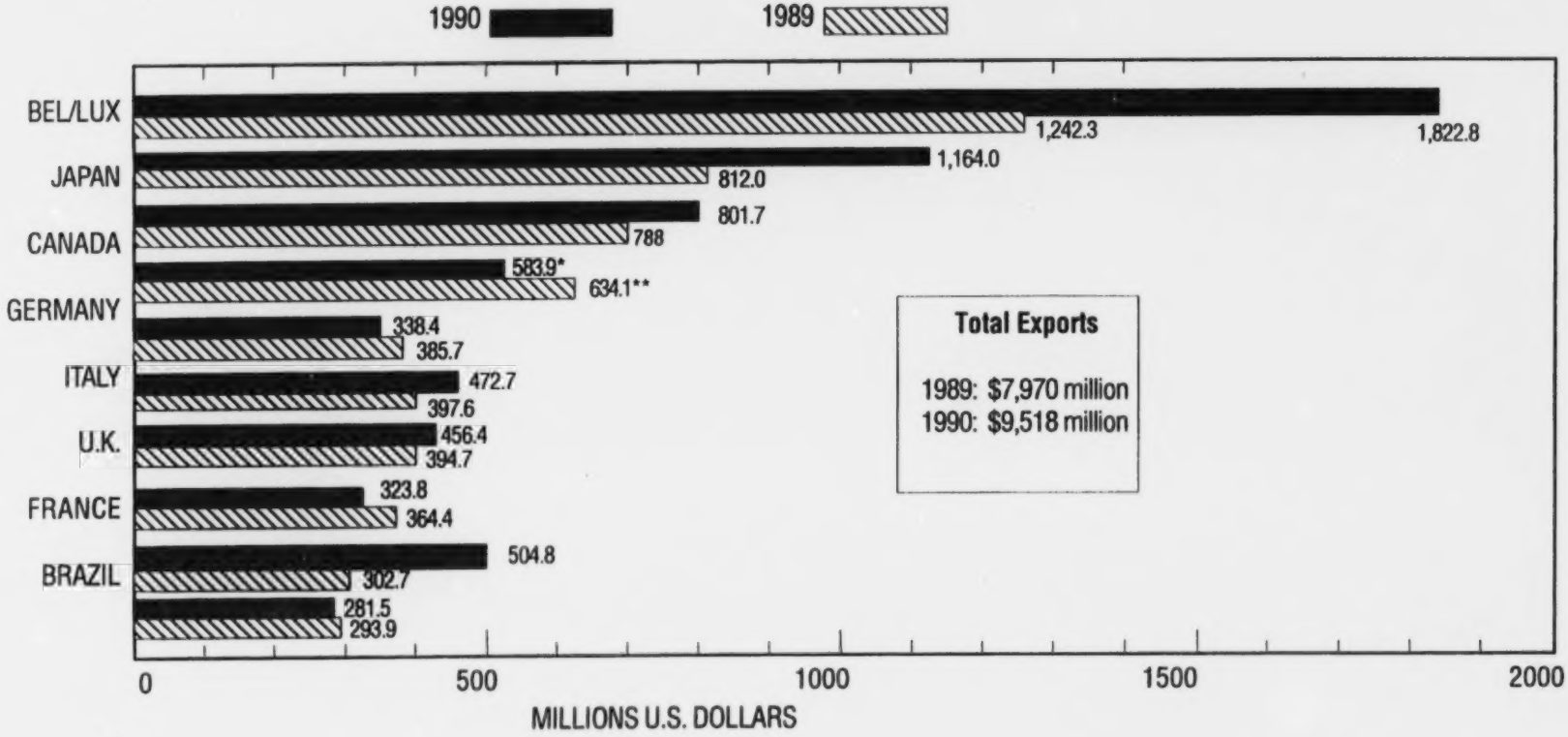
Foreign Currencies Answer Key

	Country	Currency
D	1. Canada	A. Pound
C	2. France	B. Ruble
F	3. Japan	C. Franc
A	4. England	D. Dollar
E	5. Germany	E. Mark
B	6. Russian Republics	F. Yen
D	7. United States	G. Peso
G	8. Mexico	

Who We Do Business With

Commodity	Exported to:
1. Livestock	Turkey, Tunisia
2. Potatoes	Canada
3. Soybeans	Japan
4. Horses and ponies	Japan, Europe, the Middle East
5. Poultry products	Worldwide
6. Peanuts	Germany
7. Forest products	Japan, Taiwan, Korea

Virginia Exports 1989-1990



SOURCE: USDOC

* Represents a United Germany
** Represents West Germany

45

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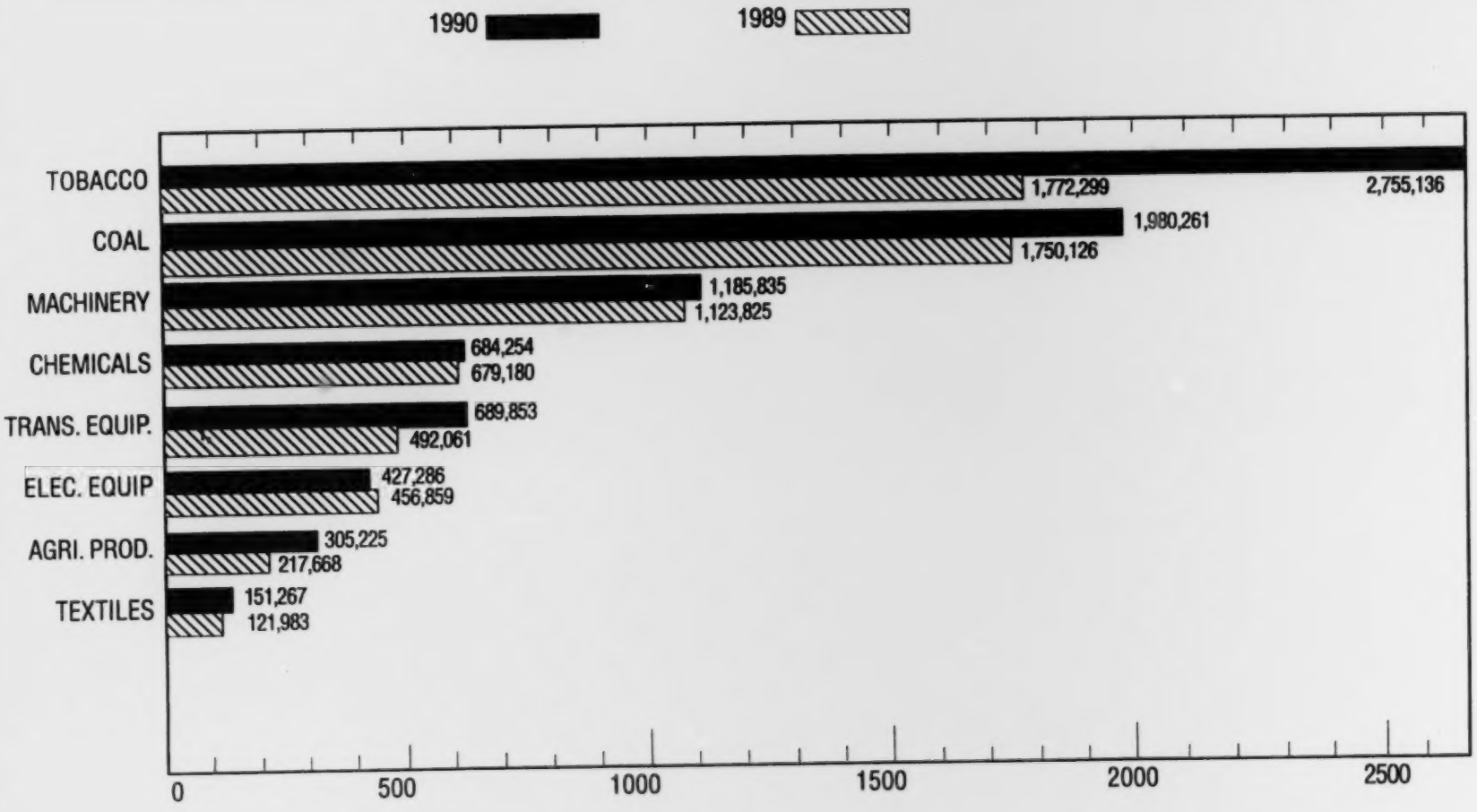
Virginia Export Products 1989-1990



SOURCE: USDOC

47

48

Video: The Case of the Sneaky Snack

Name_____

Date _____

1. What is the boy's name?

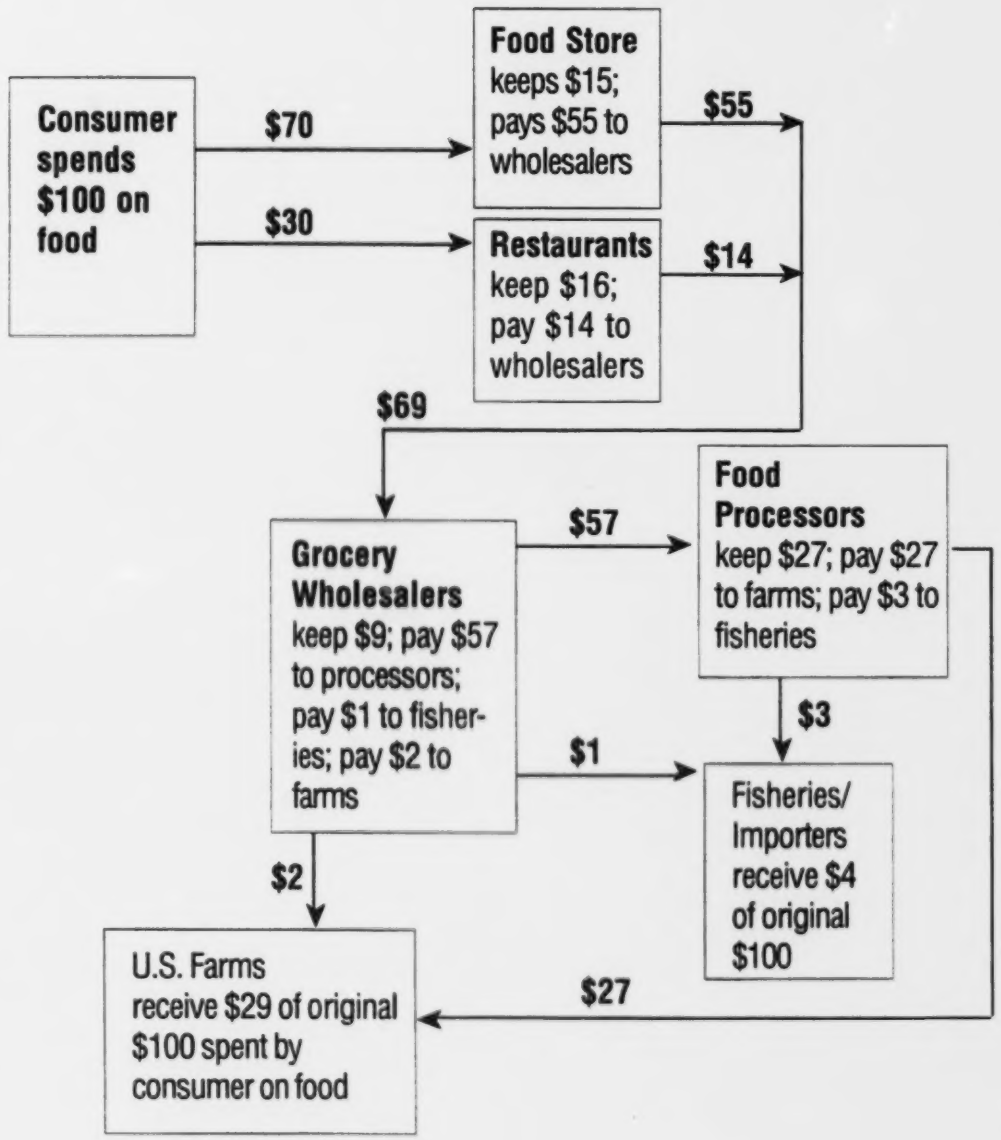
2. What were the clues discovered in the house?

4. What are the two types of tomatoes grown?

5. How long does it take to process the tomatoes from field to can?

6. How much milk is needed to make one slice of cheese?

Distribution of $100 of Consumer Food Spending


Consumer spends $100 on food
$70
$30
Food Store keeps $15; pays $55 to wholesalers
Restaurants keep $16; pay $14 to wholesalers
$55
$14
$69
Grocery Wholesalers keep $9; pay $57 to processors; pay $1 to fisheries; pay $2 to farms
$57
$1
$2
Food Processors keep $27; pay $27 to farms; pay $3 to fisheries
$3
Fisheries/ Importers receive $4 of original $100
$27
U.S. Farms receive $29 of original $100 spent by consumer on food

Agricultural Processing Quiz

Name_____

Date _____

1. What steps must be taken at the farm to prepare the product for transport to the processor?
   a.
   b.
   c.
   d.
   e.

2. List three methods of transporting agricultural products.
   a.
   b.
   c.

3. Identify the three steps that occur in packaging food at the processing plant.
   a.
   b.
   c.

4. List two functions that occur at the processing plant.
   a.
   b.

DUTY AREA 2: OVERVIEW
Introducing Plant and Animal Life Cycles

- **Competencies/Tasks**
  - 2.1 Identify and explain functions of plant systems.
  - 2.2 Identify basic requirements for plant growth and development.
  - 2.3 Identify plants of economic importance to the community.
  - 2.4 Identify basic requirements for animal growth and development.
  - 2.5 Identify careers in plant science.
  - 2.6 Identify careers in animal science.

- **Lessons**
  - 2.1 Functions of Plant Systems
  - 2.2 Requirements for Plant Growth and Development
  - 2.3/2.5 Plants of Economic Importance to the Community and Careers in Plant Science
  - 2.4 Basic Requirements for Animal Growth and Development
  - 2.6 Careers in Animal Science

- **Evaluation**

  Suggestions for evaluation appear at the end of each lesson. A sample quiz appears at the end of the duty area.

DUTY AREA 2
Introducing Plant and Animal Life Cycles

Lesson 2.1 Functions of Plant Systems

Student Objectives

1. Discuss the role of plants in the life cycle.
2. List and describe the purpose of the four main parts of a plant.
3. Define and describe the purpose of photosynthesis.

References

Cooper, Elmer L. *Agriscience: Fundamentals and Applications.* Albany: Delmar, 1990.
Reiley, H. Edward, and Carroll L. Shry. *Introductory Horticulture.* Albany: Delmar, 1988.
Wright, Jill, Charles R. Coble, Jean Hopkins, Susan Johnson, and David LaHart. *Prentice Hall Life Science.* Englewood Cliffs: Prentice Hall, 1988.

Equipment, Supplies, Materials

overhead projector
diagram of plant (6VA 2.1 and 2.2)
pictures of various plants from magazines and catalogs

Presentation

A. Introduction

Ask students to imagine what the world would be like without plants. This lesson examines the role of plants in the environment and introduces students to the main parts of plants and their functions.

B. Motivation

Discuss the importance of plants in the life chain. Emphasize that life on earth could not exist without plants, and that plants are directly or indirectly a source of food for all humans.

C. Discussion

Use the plant diagram (6VA 2.1) to examine the parts of a plant. Have students label each part and describe its purpose on their worksheets.

1. *Question: What are the functions of the leaves?*
   Answers: The leaves make food for the plant through the process of photosynthesis. During this process, the leaves absorb light energy from the sun and carbon dioxide from the air. Throgh this process, oxygen is released into the air through the leaves. The leaves also store the food that is created for the plant.
   Suggested Activity: To illustrate how leaves give off water in the transpiration process, cover a plant with a clear plastic wrapper for several days.

2. *Question: What are the functions of the stem?*
   Answers:
   - It transports water and nutrients to the leaves.
   - It carries the food produced by the leaves to other parts of the plant.
   - It supports the plant's leaves and flowers.

   Suggested Activity: To illustrate the function of the stem, place several stalks of celery in a cup of red-colored water for 24 hours. Remove the stalks and observe how far the red water has traveled. Cut a cross-section of the stalk to inspect the location of the colored water.

3. *Question: What are the functions of the roots?*
   Answers:
   - They anchor the plant and hold it up.
   - They absorb water and nutrients from the soil.
   - They store food for longer periods of time so the plant can survive when it loses its leaves.

   Suggested Activity: Bring in samples of different types of roots and discuss how they differ.

4. *Question: What are the functions of the flowers?*
   Answers:
   - They attract insects for pollination.
   - They produce seeds and fruit.
   - They are the site of plant reproduction.

   Suggested Activity: Bring in samples of various flowers and of their seeds or fruit, and ask students to match them.

D. Other Activities

1. Using pictures of various plants, have students identify the plant's parts and explain each part's role in the life of the plant.
2. Ask students to keep a record of the food they eat during a one-week period and identify all the foods on their lists that come from plants. Have students also identify the part of the plant from which the food is made.

E. Conclusion
Plants are a basic component of the food chain: humans eat plants and also the meat from animals that eat plants. Have students try to think of a way to live without the benefit of plants.

F. Evaluation
A sample test is provided at the end of this duty area.

Lesson 2.2 Requirements for Plant Growth and Development

Student Objectives

1. Explain how plants produce food.
2. Describe the roles of air, water, light, and media in plant growth and development.
3. Construct a greenhouse terrarium and explain how it provides an environment for plant growth.

References

Cooper, Elmer L. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.
Reiley, H. Edward, and Carroll L. Shry. *Introductory Horticulture*. Albany: Delmar, 1988.

Equipment, Supplies, Materials

worksheet 6VA 2.3
supplies for constructing a terrarium: 2-liter soda bottles, scissors, 2-inch masking tape, potting soil, water, seeds

Presentation

A. Introduction
This lesson presents how plants live and grow and the minimum requirements for plant growth.

B. Motivation
Ask students to make a list of requirements for basic survival. The list should include shelter, water, food, air, and clothing. Ask students to pretend they are plants, and again list the rquirements for survival. The list should include soil, water, nutrients, air, and light. Compare this list with the list of what humans need to survive.

C. Discussion
1. *Question: What is meant by* media?
Answer: *Media* is whatever material a plant grows in and gets food from. Media may be soil or a soil substitute, such as peat moss, perlite, or even water. The plant needs a place for its roots to grow and a place from which it can absorb nutrients. The media acts as a shelter for the plant by giving it a place to grow, just as humans must have a place to live.

Suggested Activity: Bring in examples of various media to emphasize that media includes more than soil.

2. *Question: What nutrients do plants need?*
Answer: Just as humans need food to survive, plant need nutrients to grow. In fact, humans and plants need some of the same vitamins and elements, such as calcium, iron, and zinc. Just as humans need a diet balanced between the different food groups, plants need a diet balanced between three main nutrients: nitrogen, phosphorus, and potassium, represented by the letters N, P, and K. They also need a number of minor elements. Plants get some of the nutrients they need from the media in which they grow, but more nutrients may need to be added, just as people may take vitamins to get nutrients missing from their food.

3. *Question: What is water's role in a plant's life?*
Answer: Most plants require a great deal of water for proper development. Plants get the water they need in several ways: 1) they can receive it directly from rain, irrigation, misting, or a bucket; 2) they can absorb it through their roots if they are placed in water; or 3) they can absorb water that is in the air. Water in the air is called *humidity*. If there is too little moisture in the air, the plant will slow down its growth or even wilt, just as people's skin gets dry and cracked when the air is too dry.

4. *Question: What is a plant's relationship with air?*
Answer: Plants clean the air, which is helpful to humans. Plants absorb carbon dioxide from the air and use it to produce food, then they give off oxygen as a by-product of this activity.

5. *Question: What is light's role in a plant's life?*
Answer: Plants must have light in order to make food, and they must have food to live. The process of making food from light is called *photosynthesis* and takes place in the plant's leaves. The amount of light affects whether or not the plant will bloom or flower. Plants can live in either sunlight or artificial light.

D. Other Activities

Terrariums demonstrate how the requirements for plant growth work together. In particular, terrariums can be used to demonstrate condensation and humidity. To make a terrarium using plastic soda bottles:

1. Separate the two-liter bottle from the plastic "dish" at the bottom. (Running hot water over the bottom helps loosen the glue.)
2. Cut off the bottle about three inches below the spout.
3. Plant a seed or small plant into the dish part. Marigolds, zinnias, and vegetables work well.
4. Invert the cut-off bottle so it will fit over the dish.
5. Tape the bottle onto the dish so that the unit will be fairly airtight.
6. Place the unit in a window, and in about one week there should be some sprouting or growth, depending on what was planted.

E. Conclusion
Plants and humans have very similar needs for survival. Remembering what people need in order to live can serve as a reminder of what plants need.

F. Evaluation
Tests or quizzes can be developed from the material presented in this lesson. A sample test is provided at the end of this duty area.

Lesson 2.3 Plants of Economic Importance to the Community and Careers in Plant Science

Student Objectives

1. List ten major flowers or floral materials purchased for various holidays and special occasions.
2. Define *landscaping* and draw a workable landscaping plan for a home.
3. Identify five careers in plant science.

References

Cooper, Elmer L. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.
Reiley H. Edward, and Carroll L. Shry. *Introductory Horticulture*. Albany: Delmar, 1988.

Equipment, Supplies, Materials

local *Yellow Pages* directory
blank paper
crayons, colored pencils, markers
rulers

Presentation

A. Introduction

This lesson considers the economic importance of plants to a community and the various careers available in plant science. To introduce the lesson, ask students what the words *landscaping, florist,* and *garden center* bring to mind. List the jobs each area might involve.

B. Motivation

Give each student a local *Yellow Pages* directory. Divide the class into groups of two or three, and have them find examples of local horticultural industries (e.g., florists, garden centers, landscapers, etc.). Ask how many of the students are interested in working in these types of businesses.

C. Assignment
After the motivation activity, list each major holiday on the board, along with any other special occasions. Have students list various flowers, plants, and other appropriate horticultural materials that are used for these occasions.

D. Discussion
1. *Question: What are* ornamental horticulture *and* floriculture?
Answer: The field of horticulture is more than just the study of plants. It also includes the marketing of flowers, using floral materials for decoration, and using plants to beautify the home. The decorative use of plants and flowers is called *ornamental horticulture* and *floriculture*.
Suggested Activity: Have students give examples of flowers and other products sold by florists, e.g., roses, carnations, mums, greenery, potted plants, balloons, bows, wreaths, poinsettias, lilies, vegetables, cards, stuffed animals, silk flowers. Allow students time to talk about flowers they have used or seen given as gifts.

2. *Question: What is* landscaping?
Answer: *Landscaping* is the process of beautifying the terrain with plantings of trees, shrubs, flowering herbs, and ornamental features such as terraces, rock gardens, pools, walkways, and driveways.

3. *Question: What are some careers in plant science?*
Answer: Using the names students found in the phone book, compile a list of local horticultural businesses. Have students describe the jobs they believe are available in each business. Examples: florist, landscape designer, greenhouse manager, maintenance person, orchardist.

E. Other Activities
1. Have students draw a simple home or give them a picture of a house. Have them use colored pencils, crayons, or magic markers to landscape the area around the home. Judge the work, and award the winner a small prize.
2. Visit a local commercial greenhouse and florist.
3. Invite a florist, greenhouse manager, or landscaper to visit the class.

F. Conclusion

Jobs in agriculture do not necessarily involve large farm operations or raising animals. The horticulture industry has many opportunities ranging from small shops and part-time employment to large-scale operations and full-time careers.

G. Evaluation

A sample test is provided at the end of this duty area.

Lesson 2.4 Basic Requirements for Animal Growth and Development

Student Objective

Identify the basic needs of animals.

References

Animal Agriculture: Myths and Facts. Arlington: Animal Industry Foundation, 1988.
Cooper, Elmer L. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.

Equipment, Supplies, Materials

incubator
fertilized eggs
feed
newborn animals (if feasible)

Presentation

A. Introduction
In Lesson 2.2 students listed their own basic needs, which included shelter, food, water, air, and clothing. Animals need the same things as humans do in order to survive. This lesson covers what animals need in order to live and grow.

B. Motivation
Divide students into groups and let each group develop a luxurious (perhaps ridiculous) farm for animals that meets the four basic needs of shelter, food, water, and "clothing." Have them share their ideas with the rest of the class.

C. Assignment
Have students read the pamphlet on animal agriculture listed in the *References* section. Ask them to list the pamphlet's three myths about the animal industry and explain why these are considered myths.

D. Discussion

1. *Question: What are the basic needs of animals?*
   Answer: Animals (including humans) have four basic needs:
   - Shelter: a barn, a feedlot, a pond, a poultry house, etc.
   - Food: feed, hay, special rations, or perhaps even bottle feeding. Animals require certain nutrients and additives in their feed in order to grow and produce to the best of their abilities. Because animals eat no junk food, they probably eat better balanced diets than most humans do.
   - Water: access to fresh, clean water through streams, troughs, pools, and other sources. Water aids in digestion and helps the animal's systems work together properly.
   - Clothing: Although we don't normally think of animals as needing clothing, animals have different ways of adapting to their surroundings. Some animals "make" their clothing when they need it by fortifying their natural coats when the weather demands it. Cattle put on extra fat and hair during the winter; sheep have their wool to keep them warm; some birds fly south. Some "indoor" types of animals such as chickens and turkeys have the luxury of heaters to keep them warm. All animals, however, must have some means of adapting to their environment.

E. Other Activities

1. Have someone bring in a baby farm animal. Discuss what this animal will need to grow and produce to the best of its ability. Have students adopt the animal and keep track of its growth and development.
2. Hatch chickens, quail, or other birds in class. Have students keep records of the incubation process and of what the new birds need to grow and develop.

F. Conclusion

Humans are animals. Recalling what humans need to live serves as a reminder of the basic requirements of other animals.

G. Evaluation

A sample test is provided at the end of this duty area.

Lesson 2.5 Careers in Animal Science

Student Objectives

1. Identify five careers in the meat animal industry.
2. Identify five careers in the production animal industry.
3. Identify careers in the service industry for animal science.

References

Cooper, Elmer L. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.

Equipment, Supplies, Materials

local *Yellow Pages* directory
magazines from various meat animal industries

Presentation

A. Introduction
Have students list everything they have eaten for their last two meals. Identify the meat items and other animal products, such as milk, cheese, and drippings for gravy. Discuss how much of their diet is made up of animal products.

B. Motivation
Show a variety of television commercials and/or magazine advertisements about the animal industry. Ask students to evaluate the products advertised and discuss how these animal products affect their daily lives.

C. Assignment
Divide the class into groups and assign each group a different animal species, e.g., beef cattle, sheep, swine, dairy cattle, chickens, turkeys, seafood. Have each group develop a list of marketable products from their animal and share the list with the class.

D. Supervised Study

Distribute local *Yellow Pages* directories to the class, and have students find ten or more careers, jobs, or businesses that relate to the animal science industry.

E. Discussion

1. *Question: What are some careers available in the meat animal industry?*
   Answer: Because so much of our diet relies on the meat animal industry, it is the largest career area in animal science. Some of the many careers in the meat animal industry are

Butcher	Food scientist
Food processor	Chef
Meat inspector	Feed lot operator
Sheep farmer	Swine (pig) farmer
Poultry farmer	Beef cattle farmer

2. *Question: What are some career opportunities in the production animal industry?*
   Answer: Production animals provide a product without being slaughtered. Examples: cows that produce milk, chickens that lay eggs, and sheep that produce wool. When these animals can no longer produce, they are slaughtered for meat and become part of the meat-animal industry. Some jobs in the area of animal production are:

Sheep shearer	Milker
Egg gatherer	Weaver
Dairy farmer	Scientist developing new milk products

3. *Question: What are some of the service careers in the animal science industry?*
   Answer: Various service people work with animals to better the agricultural industry. Some of these jobs are:

Veterinarian	Scientist
Feed nutritionist	Tractor mechanic
University professor	Agricultural extension agent

F. Other Activities

Have students contact a business person in the animal science industry and give a class report on that person's job.

G. Conclusion

Discuss where in the animal science industry students might want to work and why. Remind students of how animal agriculture affects our daily lives.

H. Evaluation

A sample test is provided at the end of this duty area.

Duty Area 2 Evaluation
Introducing Plant and Animal Life Cycles

Name_____

Date _____

I. True or False: circle the correct letter.

T F 1. Pollination is the fertilization process to make fruit and seeds.
T F 2. Stems are a nutrient "highway" for the plant.
T F 3. Plants are used for food, medicines, and some clothing.
T F 4. Humidity refers to the amount of nitrogen in the air.
T F 5. Peat moss is a soil substitute.
T F 6. Three main plant nutrients are nitrogen, phosphorus, and potassium.
T F 7. Plants compete with humans for clean air.
T F 8. Irrigation is a form of direct watering.
T F 9. Plants need correct amounts of sunlight to make food and to flower.
T F 10. Animals have the same nutritional requirements as humans.
T F 11. Baby animals and grown animals have the same needs.
T F 12. Animal agriculture is only important to farmers.
T F 13. Sheep shearers work with meat animals.
T F 14. Meat animals are used for food.
T F 15. The job opportunities in animal science are very limited.

II. Fill-in-the-Blank: write your answers in the spaces provided.

16. The material plants grow in is called _____.
17. Calcium, _____, and _____ are some of the elements that both plants and humans need.
18. Beautifying the land with plants, shrubs, and trees is called _____.
19. The four basic needs of animals are _____, _____, _____, and _____.
20. The _____ industry is the largest career area in animal science.
21. _____ is the process of flower fertilization.
22. Humidity is _____ in the air.

II. Fill-in-the-Blank: write your answer in the space below the question.

23. Explain how plants clean the air.

24. What function does light serve for plants?

25. List three careers in horticulture.

_____

_____

_____

26. Why must animals have fresh, clean water?

27. List three careers in the meat animal industry.

_____

_____

_____

28. Explain the difference between a meat animal and a production animal.

Duty Area Evaluation Answer Key

1. T
2. T
3. T
4. F
5. T
6. T
7. F
8. T
9. T
10. F
11. F
12. F
13. F
14. T
15. F
16. Media
17. Iron, zinc
18. Landscaping
19. Shelter, food, water, clothing
20. Meat animal
21. Pollination
22. Water
23. Answers will vary.
24. Answers will vary.
25. Answers will vary.
26. Answers will vary.
27. Answers will vary.
28. Answers will vary.

Parts of a Plant

1. Flower

2. Leaves

3. Stem

4. Roots

Plant Identification Quiz

Directions: write the name of each part of the plant on the line beside it.

1. _____

2. _____

3. _____

4. _____

Worksheet: What Plants Need to Live

1. Media:

2. Nutrients:

3. Water:
   Direct Watering:

   Humidity (water in the air):

4. Air:

5. Light:

DUTY AREA 3: OVERVIEW
Communicating with Others

- **Competencies/Tasks**
  - 3.1 Discuss the importance of effective communication.
  - 3.2 Participate in a group discussion.
  - 3.3 Communicate on the telephone.
  - 3.4 Communicate through letters.
  - 3.5 Communicate through newspaper, radio, and television releases.

- **Lessons**
  - 3.1 The Importance of Effective Communication
  - 3.2-3.5 Practicing Forms of Communication

- **Evaluation**

  Suggestions for evaluation appear at the end of each lesson. A sample duty area evaluation appears at the end of the duty area.

DUTY AREA 3
Communicating with Others

Lesson 3.1 The Importance of Effective Communication

Student Objectives

1. Define the word *communication*.
2. List reasons why effective communication is important.
3. List basic skills needed for effective communication.
4. List different ways in which we communicate.

References

Exploring 4-H Leadership, Member's Guide. Stillwater: Southern Region 4-H Literature Committee.

FFA Student Handbook. Alexandria: National FFA Organization, latest edition.

Media Handbook for Volunteer Groups. Blacksburg: Virginia Cooperative Extension Service, 1984.

Equipment, Supplies, Materials

TV/VCR
light bulb and lamp

Presentation

A. Introduction

People spend a great deal of time each day communicating with others. In a single day, a person might talk with friends, teachers, shop clerks, and parents. People communicate face-to-face, over the telephone, in writing, and even through body language. This lesson explores different ways of communicating and the difference between merely talking with others and truly communicating with them.

B. Motivation (select one)

1. Play the game *Gossip*. Whisper a phrase relating to agriculture into a student's ear, and have each student repeat the phrase to the next student until it is passed all the way around the room. Have the last student say the phrase aloud. Discuss why the phrase changed when passed from student to student.

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2. Have each student write a simple set of directions, such as how to program a VCR to tape a favorite show or how to replace a light bulb. Have several students follow the directions and attempt the task in class. In either of the motivators above, discuss why it is important to say or write exactly what is meant, and why this is so difficult.

C. Discussion

1. *Question: What is* communication?
   Answer: *Communication* is the sharing of ideas or information with others.

2. *Question: Why is effective communication important?*
   Answers:
   - It is an essential skill of a good leader.
   - It is necessary in order to convey ideas and suggestions and to be understood by others.
   - It is a basic requirement for success.

3. *Question: What are some basic skills needed for effective communication?*
   Answers:
   - listening skills
   - oral expression skills
   - writing skills
   - effective body language

4. *Question: What are some examples of ways we communicate?*
   Answer:
   - conversation
   - letters or reports
   - body language—sad, happy, angry
   - telephone
   - FAX machines
   - computer networks

D. Other Activities

Have students select a method of communication and use it to relate something to the rest of the class. Students might choose to communicate about a favorite subject, interests, dislikes, or an attitude.

E. Conclusion

Communication is an important part of everyday life. Success in life often depends on

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good communication skills. Effective communication, regardless of the particular method used, requires expressing oneself clearly and understanding the others involved.

F. Evaluation
A sample duty area test appears at the end of this duty area.

Lesson 3.2 Practicing Forms of Communication

Student Objectives

1. Participate in a group discussion.
2. Demonstrate the ability to talk on the telephone.
3. Write a letter requesting information.
4. Prepare an article for the media.

References

Exploring 4-H Leadership, Member's Guide. Stillwater: Southern Region 4-H Literature Committee.

FFA Student Handbook. Alexandria: National FFA Organization, latest edition.

Media Handbook for Volunteer Groups. Blacksburg: Virginia Cooperative Extension Service, 1984.

Reporter's Handbook. Alexandria: National FFA Organization, latest edition.

Equipment, Supplies, Materials

four telephones
a computer with word processing capabilities
overhead projector
transparency 6VA 3.1

Presentation

A. Introduction

The first lesson in this duty area introduced the importance of communication. This lesson explores methods of communication and develops communication skills.

B. Motivation (select one)

1. Divide students into small groups to practice introducing one another.
2. Select two students to role play a telephone conversation. Have one student play the part of a polite person and the other the part of a rude person.

C. Discussion

1. *Question: What is a* group discussion?
   Answer: A *group discussion* is any number of people gathered together to talk about a problem or concern. Generally, one subject is talked about at a time, and each person is given time to share his or her ideas.

2. *Question: What are some important guidelines to remember in group discussions?*
   Answer:
   - Take turns speaking.
   - Listen carefully to each person.
   - Don't monopolize the conversation.
   - Speak calmly; don't argue.

   Suggested Activity: Have students develop some topics for group discussions. Then, break students into small groups and allow them to discuss one of the topics. After the discussion, review the basic guidelines for participating in a group, and determine whether students followed the guidelines.

3. *Question: What are some guidelines for talking on the telephone?*
   Answers:
   - Speak clearly.
   - Speak in a normal tone.
   - Talk into the phone receiver.
   - Answer the phone politely.
   - Identify yourself, whether calling or being called.
   - Call during suitable hours, i.e., afternoons, after homework hours, and weekends.
   - Make your call brief.
   - The person who makes the call should be the first to say good-bye.
   - When taking messages for someone else, be sure to get correct information. Repeat phone numbers or addresses for clarity.
   - When taking messages from an answering machine, be sure to write down information for those who are not available when a message is left for them.

   Suggested Activity: Make some practice telephones available to students. Suggest situations for them to role play, e.g., making a call to request information, ordering an item from a business, talking to a friend, or scheduling an appointment.

4. *Question: What are two types of letter writing?*
   Answer: Formal and informal.

5. *Question: What are some examples of formal letter writing?*
   Answers: A thank-you letter to a sponsor or donor, a request for information, an invitation to speak at a banquet.

6. *Question: What are some examples of informal letter writing?*
   Answer: Postcards, letters to friends, thank-you notes to friends or relatives, birthday greetings.
   Suggested Activity: Review the basics of spelling, punctuation, and grammar. Have students write a formal and informal letter related to a subject at school that they are interested in.

7. *Question: What is* the media?
   Answer: *Media* refers to the form of communication. The three major forms of mass media are newspapers, radio, and television.

8. *Question: What are some basic guidelines for communicating through the media?*
   Answers:
   - Use the 5 Ws of news writing—who, what, where, when and why.
   - Place the most important information first.
   - Be brief and concise.
   - On radio and television, community events are best publicized through public service announcements (PSAs).
   - PSAs are written in either 10-, 30-, or 60-second runs.

   Suggested Activity: Pass out sample news articles and PSAs for students to review, then have each student write a news article and/or PSA related to agriscience.

D. Other Activities
   1. If a computer is available, allow students to use a word processing program to develop their articles.
   2. Develop a newspaper for the class with students as reporters.
   3. Have students develop a new method of communication.
   4. Take students to a FAX machine and show them how it works.

E. Conclusion
   Communication occurs constantly and in many forms in our daily lives. Communication may be formal or informal. The mass media (newspapers, radio, and television) provide ways to communicate with many people at once.

F. Evaluation
   A sample test is provided at the end of the duty area. Students could also be evaluated on the basis of their news articles.

Duty Area 3 Evaluation
Communicating with Others

Name_____

Date _____

I. True or False: Circle the correct letter for each statement.

T F 1. Communication is the sharing of ideas.

T F 2. Communication requires good listening skills.

T F 3. Communication skills are not important to be successful.

T F 4. Body language is a form of communication.

T F 5. Radio is classified as media.

T F 6. Group discussions do not allow for everyone to speak.

T F 7. During a group discussion, shouting is a good way to be heard.

T F 8. Telephones are not important in communication.

T F 9. A thank-you note to a relative is an example of formal letter writing.

T F 10. PSA stands for public student audience.

II. Circle the letter that corresponds to the best answer.

11. What are the three major forms of mass media?
    a. Radio, television, magazines
    b. Roadmaps, VCRs, newspapers
    c. Radio, television, newspapers

12. The 5 Ws of news writing are:
    a. Who, where, how, why, and what
    b. Who, what, where, when, and well
    c. Who, what, where, when, and why

13. Public service announcements are usually
    a. 10 seconds
    b. 30 seconds
    c. 60 seconds
    d. All of the above

14. The following is an example of communication:
    a. Speech
    b. Letters
    c. Body language
    d. All of the above

III. Complete the following short answer questions.

15. Your best friend calls you on the phone during your homework time. What would your response to your friend be if your mother had given you strict orders not to talk on the phone?

16. How should you answer the telephone at your home?

IV. For each type of letter listed below, indicate whether it is formal or informal.

17. Invitation to a party _____

18. Thank you note to a sponsor _____

19. Birthday greetings _____

20. Request for information _____

Duty Area 3 Evaluation Answer Key

1. T
2. T
3. F
4. T
5. T
6. F
7. F
8. F
9. F
10. F
11. C
12. C
13. D
14. D
15. Answers will vary.
16. Answers will vary.
17. Informal
18. Formal
19. Informal
20. Formal

The 5 Ws of a News Article

Who?

What?

Where?

When?

Why?

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DUTY AREA 4: OVERVIEW
Introducing Agricultural Mechanics Technology

- **Competencies/Tasks**
  - 4.1 Explain the importance of agricultural mechanics technology.
  - 4.2 Identify basic laboratory safety procedures.
  - 4.3 Describe new agricultural engineering technologies.
  - 4.4 Identify and use basic hand tools for woodworking.

- **Lessons**
  - 4.1 The Importance of Agricultural Mechanics Technology
  - 4.2 Laboratory Safety Procedures.
  - 4.3 New Agricultural Engineering Technologies
  - 4.4 Identification and Use of Basic Hand Tools for Woodworking.

- **Evaluation**

  Suggestions for evaluation appear at the end of each lesson. A sample duty area evaluation appears at the end of the duty area.

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DUTY AREA 4
Introducing Agricultural Mechanics Technology

Lesson 4.1 The Importance of Agricultural Mechanics Technology

Student Objectives

1. List five reasons why agricultural mechanics technology is important.
2. List five important developments in agricultural mechanics technology.
3. List five careers in agricultural mechanics.
4. List four scientific principles applied to mechanics technology.

References

Burke, Stanley R., and T. J. Wakeman. *Modern Agricultural Mechanics*. Danville: Interstate, 1992.

Cavendish, Marshall. *Science Project Book of Mechanics*. London: William Collins Sons, 1987.

Cooper, Elmer L. *Agricultural Mechanics: Fundamentals and Applications*. Albany: Delmar, 1987.

Engineering and Related Occupations. Video. St. Paul: Hobar.

Hensen, Kenneth T., and Delmar Janke. *Elementary Science Methods*. New York: McGraw-Hill, 1984.

Production I. Video. St. Paul: Hobar.

Equipment, Supplies, Materials

TV/VCR
magazines illustrating agricultural technologies
career videos from Hobar Publications

Presentation

A. Introduction

In the United States, agriculture is highly mechanized. This lesson discusses the importance of agricultural mechanics technology and its relationship to science. Agricultural mechanics technology teaches skills that can be applied to repairing tractors, small engines, farm equipment, bicycles, automobiles, stereos, appliances, and garden tools.

B. Motivation (select one)
   1. Show a video on careers in agricultural mechanics.
   2. Bring in photos or magazines showing agricultural mechanics technology and discuss what is represented.

C. Assignment
   Develop a collage on the theme of "Agricultural Mechanics."

D. Discussion
   1. *Question: Why is agricultural mechanics technology important?*
      Answers:
      - It teaches important skills that can be used at home, in business, or for leisure.
      - Many of the careers in agriculture involve agricultural mechanics.
      - Agriculture is now so mechanized that skilled people are needed to keep productivity high.
      - Mechanization increases worker productivity by reducing the time required to perform the task.

      In terms of employment, agriculture is the largest industry in the United States. Recent estimates indicate that 20-25% of the nation's workforce is employed in agriculture. Because of advanced mechanization, a farmer can produce enough food and fiber for 115 people. Mechanization has also made it possible for than less 2% of the population to farm and yet produce enough agricultural products for our country.

   2. *Question: What advancements in agricultural mechanization have had the greatest impact on society?*
      Answers:
      - cotton gin: Eli Whitney, 1793
      - reaper: Cyrus McCormick, 1834
      - steel plow: John Deere, 1837
      - mechanical corn picker: Edmund W. Quincy, 1850
      - tractor: Benjamin Holt, 1904

      Show pictures of how the work was done before and after each invention. Discuss what changed because of the inventions.

   3. Question: *What are some careers in agricultural mechanics technology?*
      Answer:
      - electrician
      - machinery and equipment specialist
      - parts person
      - soil technician

- tractor mechanic
- ecology technician
- shop supervisor

Have students name individuals in the community who work in these types of jobs or similar jobs.

E. Other Activities
1. Plan a field trip to an agricultural mechanics facility.
2. Have students think of their own agricultural mechanics invention.

F. Conclusion

Agricultural mechanics technology is an important area of work: the major mechanical advancements in the 1800s helped make agriculture as strong an industry as it is today. Similarly, the technology developed today will help determine the strength of agriculture in the future. Agricultural mechanics technology offers many career opportunities. However, the skills related to agricultural mechanics technology can also be used in everyday life.

G. Evaluation

A sample test is provided at the end of this duty area.

Lesson 4.2 Laboratory Safety Procedures

Student Objective

Identify the rules of and correct procedures for the laboratory.

References

Burke, Stanley R., and T. J. Wakeman. *Modern Agricultural Mechanics*. Danville: Interstate, 1992.

Cooper, Elmer L. *Agricultural Mechanics: Fundamentals and Applications*. Albany: Delmar, 1987.

Developing Safety Skills. Slides. Athens: American Association for Vocational Instructional Materials (AAVIM).

Laboratory Safety Handbook. Richmond: Virginia Department of Education, 1981.

Equipment, Supplies, Materials

overhead projector
slide projector
transparency (6VA 4.1)

Presentation

A. Review

The previous lesson discussed the importance of agricultural mechanics technology. This lesson covers issues of safety in the agricultural mechanics laboratory. Fixing things around the home and at work requires more than just knowledge of what a tool does; it also requires knowledge of how to use the tool correctly to both extend the life of the tool and protect the user from injury.

B. Motivation (select one)

1. Show the slide program on basic laboratory safety, *Developing Safety Skills*.
2. Relate stories of accidents that have occurred either in the community or in the laboratory setting.

C. Discussion

1. *Question: Why is it important to follow safety rules?*

Answers:
- to prevent accidents
- to prevent injury to others or yourself
- to preserve life
- to maintain the tools

Discuss what can happen when safety rules are not followed, and bring in illustrations of safe and unsafe practices. Let the students determine why certain practices are safe or unsafe.

2. *Question: What guidelines help prevent accidents in the laboratory?*

Answers:
- Wear safety glasses. *This is a state law.*
- Wear protective clothing.
- Keep the shop clean.
- Avoid "horseplay" at all times.
- Do not throw objects.
- Store tools properly.
- Do not use tools without permission.
- Report all broken tools to the teacher.
- Use the correct tool for the job.
- Pay attention to your work at all times.
- Do not remove guards or shields from equipment.
- Grip tools firmly.
- Keep cutting tools sharp.
- Cut away from the body.
- Keep tools clean.

Discuss these rules, using examples or illustrations to explain each.

D. Other Activities

Have each student and parent sign a safety pledge (6VA 4.1).

E. Conclusion

Agricultural mechanics technology is an exciting area, and it is useful because everyone uses tools at some point in life to repair or construct something. However, accidents can happen easily when working in a laboratory. To minimize the possibility of an accident, follow basic safety rules.

F. Evaluation

A basic safety test is provided in 6VA 4.2. It is suggested that a passing grade be set at 100%.

Lesson 4.3 New Agricultural Engineering Technologies

Student Objectives

1. List five new agricultural engineering technologies.
2. Describe the impact of new agricultural engineering technologies on society.

References

Burke, Stanley R., and T. J. Wakeman. *Modern Agricultural Mechanics*. Danville: Interstate, 1992.

Burton, L. DeVere. *Agriscience & Technology*. Albany: Delmar, 1992.

Cavendish, Marshall. *Science Project Book of Mechanics*. London: William Collins Sons, 1987.

Cooper, Elmer L. *Agricultural Mechanics: Fundamentals and Applications*. Albany: Delmar, 1987.

Lambert, Mark. *Farming Technology*. New York: Bookwright, 1990.

Equipment, Supplies, Materials

TV/VCR

magazines illustrating agricultural technologies

Presentation

A. Introduction

Agriculture in the United States has become highly mechanized. Many of these new technologies have been developed by incorporating scientific principles into the area of mechanics. This lesson discusses new advances in research that provide alternatives to, as well as replacements for, current procedures in agriculture.

B. Motivation (select one)

1. Develop a slide presentation of new agricultural advances in your area.
2. Show the class photos, magazines, etc., depicting agricultural engineering technologies. Discuss what the pictures represent and how these technologies have advanced agriculture. Compare how work was done before and after each of these inventions.

C. Discussion

1. *Question: What are the major areas of engineering development in agriculture?*

   Answers:
   - robotics
   - laser technology
   - computer technology

- hydraulics and pneumatics
- electricity
- alternative energy sources
- buildings and structures

2. *Question: What are some inventions that have been developed in these areas?*
   Answers:
   a. Robotics
      - robotic milking arm
      - robotic sheep shearer
   b. Laser technology
      - laser surveying of land
      - inventory scanners in agribusiness
   c. Computer technology
      - computer programs used to balance rations
      - computer programs used to monitor farm equipment information
   d. Hydraulics and pneumatics
      - separating materials in processing plants, e.g., removal of poor quality French fries
   e. Electricity
      - sensors that detect changes in temperatures in a greenhouse
      - regulating light exposure to simulate breeding seasons for animals
   f. Alternative energy sources
      - solar energy to generate electricity
      - fuels such as grain, methane, animal wastes and alcohol
   g. Buildings and structures
      - growth chambers for calves
      - aquaculture facilities

   Agriculture has experienced many changes in the last century, and such changes will continue to occur. The agricultural industry is at the forefront of research to apply new technology.

D. Other Activities
   1. Select a new technology and show how the principles apply to examples from everyday life.
      Example: Hydraulics and compression of fluids: to show a relationship between fluids and compression, calculate the volume of an ordinary water hose, then cap one end and fill it with water under high pressure. When the hose is full, turn off the water, and pour the water that is in the hose into a measuring bucket. The water in the bucket should be less than or equal to the volume of the hose. Discuss these results.
   2. Have students investigate how solar energy is converted into electrical energy.

E. Conclusion
Agricultural technology has become a high-tech career area. In this field, scientific principles are applied to develop new products or procedures in the agricultural industry.

F. Evaluation
Tests or quizzes can be developed from the material in this lesson. A sample test is provided at the end of the duty area.

Lesson 4.4 Identification and Use of Basic Hand Tools for Woodworking

Student Objectives

1. Identify five basic tools used in woodworking.
2. Demonstrate use of the above tools.
3. Construct a wood project using required tools.
4. Incorporate scientific principles in woodworking by using experimentation.

References

Burke, Stanley R., and T. J. Wakeman. *Modern Agricultural Mechanics*. Danville: Interstate, 1992.

Cooper, Elmer L. *Agricultural Mechanics: Fundamentals and Applications*. Albany: Delmar, 1987.

Equipment, Supplies, Materials

hand tools
project examples

Presentation

A. Introduction

Previous lessons have discussed the importance of agricultural technology, new developments in agricultural engineering, and laboratory safety. This lesson covers the use of basic tools to build a wood project.

B. Motivation (select one)

1. Show the class several projects made by former students. Discuss how they were put together and the tools that might have been used to construct them.
2. Give students a pretest on tool identification.

C. Discussion

1. *Question: Why are hand tools important?*
   Answer: They are basic tools used in all types of work, and they can be used when power tools are not feasible.

2. *Question: Which basic tools are needed?*
   Answer: a handsaw, hammer, square, file, and block clamp. Show each tool to students.

3. *Question: How is each of these tools used?*
   Answer: Demonstrate the use of each of the above tools.

4. Questions: *What simple machines are illustrated by various shop tools?*
   Answer:
   - Inclined plane ..... step ladder
   - Wedge ..... wood or cold chisel
   - Screw ..... block clamp/vise
   - Lever ..... wrecking bar/shovel
   - Wheel and axle ..... screwdriver
   - Pulley ..... hoist

D. Other Activities
   1. Have students select a project and construct it in the laboratory. Possible projects: napkin holder, grocery list holder, wooden trivet, tie rack, key holder.
   2. Experiment with wood fasteners. Compare the holding ability of glue, nails, screws, staples, and dowel pins. Before the experiment have students predict which fasteners will hold best, and discuss the reasons for their predictions. After the experiment, discuss the principles that explain the results.

E. Conclusion
   Agricultural mechanics is an exciting and rewarding area within agriculture, and many developments in agriculture have come from research done in agricultural engineering. This woodworking project is the first step in learning mechanics. Experimenting with the materials being used helps develop research skills.

F. Evaluation
   A sample test is provided at the end of the duty area. Students' woodworking projects may also be evaluated.

Duty Area 4 Evaluation
Introducing Agricultural Mechanics Technology

Name_____

Date _____

I. True or False: circle the correct letter.

T F 1. Agricultural mechanics technology is not an important career.
T F 2. *Electrician* is a career in agricultural mechanics.
T F 3. Eli Whitney invented the corn picker.
T F 4. Accidents only happen to careless people.
T F 5. Sharp cutting tools are more dangerous than dull cutting tools.
T F 6. A hammer is an example of a lever.
T F 7. There are six simple machines.
T F 8. Wearing jewelry is dangerous in the shop.
T F 9. Safety rules are made to protect people from injuries.
T F 10. The steel plow was invented by John Deere.

II. Matching: match the tool with the type of simple machine.

_____ 11. Pipe wrench
_____ 12. Screwdriver
_____ 13. Chisel
_____ 14. Ramp
_____ 15. Hoist

A. Wedge
B. Wheel and axle
C. Lever
D. Inclined plane
E. Pulley

III. Short Answer: fill in your answer in the space below the question.

16. List four safety rules to follow in the laboratory.
    a.
    b.
    c.
    d.

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17. List two reasons why safety rules are important.
    a.
    b.

18. Why was the invention of the reaper so important?

19. Why is agricultural mechanics technology important?

IV. Essay: write your answer using complete sentences and correct punctuation.

20. Select one new development in agricultural engineering technology. Explain its uses and the impact it will have on agriculture.

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Duty Area 4 Evaluation: Answer Key

1. F
2. T
3. F
4. F
5. F
6. T
7. T
8. T
9. T
10. T
11. C
12. B
13. A
14. D
15. E
16. Answers will vary.
17. Answers will vary.
18. Answers will vary.
19. Answers will vary.
20. Answers will vary.

Student-Parent Safety Pledge

Student Pledge

I promise to

1. Take and pass each safety test with a score of 100% correct before using the agricultural mechanics laboratory.
2. Inform my teacher of allergies or handicaps before using the laboratory.
3. Wear safety glasses at all times when in the laboratory, and wear shields or helmets when doing dangerous jobs.
4. Refrain from "horseplay."
5. Wear protective clothing when necessary.
6. Avoid wearing jewelry, loose sleeves, or other loose clothing and to tie back long hair.
7. Help with shop cleanup and put tools in their proper storage area.
8. Report all accidents, including minor cuts, scratches, and splinters to the teacher immediately.
9. Never use tools or operate power machinery without permission.
10. Secure all work.
11. Use tools only for the purpose they were intended.
12. Avoid bothering other students while they are working.
13. Report to the teacher all tools and equipment that need repair.
14. Never leave machines unattended while they are running.
15. Handle and store all chemicals and flammable material properly.

I have read the above rules and discussed them with my teacher. I understand that these rules have been developed for my protection. I hereby promise that I will abide by all of these rules and by any other rules and/or safety procedures set forth by my teacher.

Signed

Student's signature Date

_____

Parent Pledge

I promise to

1. Discuss the student pledge with my child and make sure that he/she understands its importance.
2. Make sure that my child is covered by health insurance, either by a policy purchased through the school or privately.
3. Notify the school concerning any medical problems my child has.
4. Reinforce safety procedures for the use of tools and equipment in our home and/or laboratory.

Signed

Parent's signature Date

_____

Basic Safety Test

Name_____

Date _____

True or False: circle the correct response.

T F 1. Safety glasses are not required when working in an agricultural mechanics laboratory.

T F 2. Wearing protective clothing can help avoid injuries.

T F 3. Each person should help clean up the laboratory at the end of class.

T F 4. "Horseplay" is allowed in the laboratory.

T F 5. If a coworker needs to borrow a tool you are using, throw it to him/her when you are finished with it.

T F 6. It is not necessary to put tools away, because the next class will have to get them out again.

T F 7. Using tools without permission is against safety policy.

T F 8. If you find a tool that is broken, put it back so you won't be injured.

T F 9. A screwdriver should be used for prying up nails stuck in wood.

T F 10. You should pay attention to your work at all times.

T F 11. You should always take guards and shields off tools before using them.

T F 12. You should hold tools lightly, so the handles won't break.

T F 13. A dull tool is safer than a sharp tool.

T F 14. You should always cut away from yourself.

T F 15. You should keep tools free from dirt and grease to prevent them from slipping out of your hand.

Basic Safety Test Answer Key

1. F
2. T
3. T
4. F
5. F
6. F
7. T
8. F
9. F
10. T
11. F
12. F
13. F
14. T
15. T

DUTY AREA 5: OVERVIEW
Introducing Ecology and Conservation

- **Competencies/Tasks**
  - 5.1 Explain how organisms and the environment work together.
  - 5.2 Identify conservation measures.
  - 5.3 Identify various types of natural resources.
  - 5.4 Identify ecology and conservation concerns in the community.
  - 5.5 Identify clean water needs of society.
  - 5.6 Explain methods of conserving water.
  - 5.7 Discuss home water conservation techniques.
  - 5.8 Describe how agriculture and the environment are interrelated.

- **Lessons**
  - 5.1 How Organisms and the Environment Work Together
  - 5.2/5.4 Community Ecology and Conservation Methods and Concerns
  - 5.3 Types of Natural Resources
  - 5.5 Society's Need for Clean Water
  - 5.6 Methods of Conserving Water
  - 5.7 Home Water Conservation Techniques
  - 5.8 The Interrelationship of Agriculture and the Environment

- **Evaluation**

  Suggestions for evaluation appear at the end of each lesson. A sample quiz appears at the end of the duty area.

DUTY AREA 5
Introducing Ecology and Conservation

Lesson 5.1 How Organisms and the Environment Work Together

Student Objectives

1. Define the word *organism*.
2. Define the word *environment*.
3. Describe the relationship between organisms and the environment (ecology).
4. Identify examples of how organisms work in balance with each other and/or in balance with the environment.

References

Camp, William G., and Thomas B. Daugherty. *Managing Our Natural Resources*. Albany: Delmar, 1991.

Cooper, Elmer L. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.

Lytle, R. A., and Harry B. Kircher. *Investigations in Conservation of Natural Resources*. 2nd ed. Danville: Interstate, 1993.

Presentation

A. Introduction

All living things are dependent upon their environment for life. Humans are dependent upon the environment for food, clothing, shelter, medicines, and recreation. This lesson examines what is meant by *environment* and how all life participates in it.

B. Motivation

Have students list factors that make up their own environment. How is their environment different from that of an animal or plant?

BEST COPY AVAILABLE

C. Discussion

1. *Question: What is an* organism?
   Answer: An organism is a living body with organs and systems. It can be plant or animal.

2. *Question: What does* environment *mean?*
   Answer: *Environment* means all of the living (biotic) and nonliving (abiotic) things with which an organism interacts. The human environment includes water, temperature, air, chemicals, soil, plants, and animals.

3. *Question: What is the relationship between organisms and the environment?*
   Answer: All biotic and abiotic things in an environment are interdependent. A group of organisms that interacts with one another and with the nonliving environment make up an *ecosystem.* The study of this interdependency is called *ecology.* Ecology is the study of the relationship between living things and the environment.

4. *Question: What are some examples of how organisms work in balance with each other and/or in balance with the environment?*
   Answer:
   a. Community Relationships
      - Example: In a lake, fish need water and food; different types of life within the lake feed off each other; wildlife along the shore is dependent on the water and food in the water; plants on the shore provide habitat and food for wildlife, as well as preventing erosion on the banks.

   b. Symbiotic Relationships
      - Commensalism: e.g., wrens and sparrows build their nests under an osprey's nest for protection from their enemies.
      - Mutualism: e.g., flowers and insects both benefit from their relationship. Insects find food in the flowers, and at the same time help pollinate flowers.
      - Parasitism: e.g., the dodder plant wraps itself around its host, usually clover or alfalfa.

D. Other Activities

Explain how a desert or a rain forest functions as an ecosystem. How are these resources dependent on each other?

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E. Conclusion

All organisms are interdependent: the earth is one large ecosystem made up of many smaller systems. Humans are a part of these systems, and human actions can damage or help them. Since all life is dependent upon these ecosystems, they must be sustained and protected.

F. Evaluation

A sample test is provided at the end of this duty area.

Lesson 5.2/5.4 Community Ecology and Conservation Measures and Concerns

Student Objectives

1. Define the term *conservation*.
2. Explain why conservation is important to the environment.
3. List methods of conservation.
4. Explain the differences between renewable, exhaustible, and nonexhaustible resources.
5. Discuss current events relating to the environment.

References

Camp, William G., and Thomas B. Daugherty. *Managing Our Natural Resources*. Albany: Delmar, 1991.

Cooper, Elmer L. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.

Lytle, R. A., and Harry B. Kircher. *Investigations in Conservation of Natural Resources*. 2nd ed. Danville: Interstate, 1993.

Equipment, Supplies, Materials

magazines and newspapers

Presentation

A. Introduction

Ecology studies the relationship among living things and their environment. If this relationship is altered, it is most often due to the actions of humans. An increase in the world's population increases the demands placed on the environment and natural resources. Natural resources are categorized as renewable, exhaustible, or nonexhaustible which indicates their relative availability in nature. The methods of conservation and resource management used for a particular resource may vary, depending on its availability.

B. Motivation

Have students write a short response to the question *What would happen if we ran out of natural resources?* The teacher may need to list some resources on the board.

C. Assignment

1. Have students select a natural resource and give a brief oral report on it in class. Reports should include information about whether the resource is renewable, and about the conservation practices used to preserve it.
2. Divide students into small groups of environmental teams. Have each team select a news or magazine article on an environmental problem and prepare a proposal of possible ways to solve or reduce the problem.

D. Discussion

1. *Question: What does the term* conservation *mean?*
   Answer: *Conservation* means using natural resources in a way that minimizes waste and maintains the resource as much as possible.

2. *Question: Why is conservation important to the environment?*
   Answer: Through conservation, society can preserve resources while continuing to use them. Conservation represents a middle ground between exploitation of resources and full preservation of them. It allows a resource to be passed on to the next generation without giving up the benefits of the resource now.
   Alternatives to conservation:
   - Exploitation: the use of resources with no regard for their replacement. This was a practice when America was first settled. Because of the great abundance of most resources, it was difficult for people to imagine that they could ever be exhausted. As a result, fur trading and buffalo hunting caused the extinction of some animals.
   - Preservation: an attempt to prevent the use of resources in order to keep them intact. For example, national parks and game preserves do not allow hunting, in an effort to preserve wildlife resources.

3. Question: *What are some methods of conservation?*
   Answers: a. Wildlife Conservation Methods
      - impose limits on hunting
      - create game and fish commissions for wildlife management
      - provide suitable habitat (fence rows, brush areas, water)
      - control pollution
      - prevent erosion
      - create refuges, state parks, game preserves
      - use artificial stocking

      b. Forest/Plant Conservation Methods
      - limit number of trees harvested
      - create forest reserves that are not harvested
      - perform improvement cuts, thinning to allow new growth
      - remove dead or diseased trees

c. Soil Conservation Methods
- keep soil covered with plants
- cover soil with mulch
- use conservation tillage, i.e., disturb the soil as little as possible
- use contour plowing
- use strip cropping
- use crop rotation
- add organic matter to replace what is removed by crops
- avoid overgrazing land

d. Water Conservation Methods
- conserve water in everyday use
- do not pollute water
- control runoff
- control erosion

4. *Question: What is the difference between renewable, exhaustible, and nonexhaustible resources?*
Answer:
- **Renewable resources** can be replaced by human efforts, but without such management, they would soon be used up, e.g., forests and wildlife.
- **Exhaustible resources** cannot be renewed, e.g., oil, minerals, coal, soil, natural gas.
- **Nonexhaustible resources** last forever regardless of humans, but they can be damaged, e.g., water resources and air.

5. *Question: What current events are related to environmental issues?*
Answers: Some current events are the loss of rain forests, the greenhouse effect, the extinction of plant and animal species.

E. Other Activities
Have students write an essay or short story about how their lives are improved by natural resources.

F. Conclusion
In order to live in an ecosystem, it is important to understand what makes it work and the ways human actions affect it. Because life is dependent upon resources, they must be conserved to ensure that there will be an adequate supply for the future.

G. Evaluation

A sample test is provided at the end of this duty area. Peer evaluation could be used to evaluate the group proposals for solving or reducing an environmental problem.

Lesson 5.3: Types of Natural Resources

Student Objectives

1. Define the term *natural resources*.
2. List seven natural resources in the environment.
3. Describe how each resource is important to the environment.

References

Burton, L. Devere. *Agriscience and Technology*. Albany: Delmar, 1992.

Camp, William G., and Thomas B. Daugherty. *Managing Our Natural Resources*. Albany: Delmar, 1991.

Cooper, Elmer L. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.

Lytle, R. A., and Harry B. Kircher. *Investigations in Conservation of Natural Resources*. 2nd ed. Danville: Interstate, 1993.

Equipment, Supplies, Materials

classroom set of *Agriscience: Fundamentals and Applications*.
worksheet 6VA 5.1
TV/VCR

Presentation

A. Introduction

People rely on natural resources to survive and to improve life, but often forget that taking resources from the earth has an impact on the environment. Whether these resources are renewable, exhaustible, or nonexhaustible, the stress placed on the ecosystem must be carefully monitored. Ecology and conservation emphasize the importance of managing resources and balancing the positive and negative aspects of technology.

B. Motivation

Ask students to reflect on the results of running out of some natural resource such as air, soil, water, or wildlife.

C. Supervised Study

Divide the class into groups and assign each group a natural resource. Have groups visit the library to gather information on their resources. (It is suggested that each group member be assigned an individual responsibility within the group.) A handout for research (6VA 5.1) is provided at the end of the duty area. After researching their topic, have each group present its answers in oral or written form. Suggest that students use examples and visuals to support their information.

Note: Groups should be supervised to ensure that each student makes a contribution. The text *Agriscience: Fundamentals and Applications* is an excellent reference for this assignment.

D. Discussion

1. *Question: What are some characteristics and uses of natural resources?*

   Answers:
   - They occur naturally on the earth.
   - They are part of the environment.
   - They are part of the food chain.
   - They are used to improve human life.
   - They are a source of recreation.

2. *Question: What are seven natural resources and how is each important to the environment?*

   Answers:
   - Forests/Plants: provide food for animals and humans; add organic matter to soil when they decay; part of the air exchange process; help cool the earth
   - Soil: all plant life comes from soil; all growth comes from topsoil
   - Air: essential for life; part of the photosynthetic process; oxygen in air is used by animals to convert food to energy
   - Water (streams, lakes, oceans, rivers): covers approximately 70% of the earth's surface; provides recreation; provides food, minerals, etc.; necessary for all life
   - Wildlife/Fish: part of the food chain; provide recreation for people
   - Minerals: used to make hundreds of products; examples: iron, gold, salt, lead, silver
   - Energy: some forms come from plant and animal remains; provided by natural gas, coal, oil, wind, and water

E. Other Activities
   1. Videotape the oral group presentations and play them back to the class.
   2. Divide the class into groups and play *The Resource Game*: before class, develop a set of flash cards listing various resources, e.g., lion, white pine, topsoil, deer, oxygen, sand, lake, oak. In class, hand out the cards and have students find the rest of their resource group, e.g., wildlife: lion, deer, etc.; plants: white pine, oak, etc.

F. Conclusion
   The importance of protecting natural resources cannot be overstated. In order to benefit from natural resources and also pass these benefits on to future generations, their use must be monitored carefully. Realizing the importance of natural resources is the beginning point of understanding the environment.

G. Evaluation
   Prepare a checklist beforehand and have students evaluate group presentations. A sample test is provided at the end of this duty area.

Lesson 5.5 Society's Need for Clean Water

Student Objectives

1. Explain the water cycle.
2. List sources of water.
3. List uses of water.
4. Discuss threats to water quality.

References

Camp, William G., and Thomas B. Daugherty. *Managing Our Natural Resources*. Albany: Delmar, 1991.

Cooper, Elmer L. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.

Equipment, Supplies, Materials

transparency 6VA 5.2

Presentation

A. Introduction

This lesson focuses on water as a natural resource and its importance to society. We will identifies the sources of water on earth and explains the water cycle (how water travels from place to place). It also covers the major uses of water and how the water supply is threatened.

B. Motivation

Have students make a list of the ways water is used in their daily lives, e.g., drinking, bathing, processing food, watering plants, washing clothes.

C. Discussion

1. *Question: What is the water cycle, and how does it work?*

   Answer: The water cycle is the circulation of water from the atmosphere to the earth and back to the atmosphere. The amount of water doesn't change but its location does. It is called a cycle because it is a process that repeats over and over. The water cycle is driven by the sun. (See 6VA 5.2.) Steps in the water cycle are:

   - Water is heated by the sun.
   - The heated water evaporates into the atmosphere.
   - Clouds form in the atmosphere.

- Clouds move over land and the moisture condenses.
- The moisture is released as rain, snow, sleet, or hail.
- Water falls to land and 1) runs off to streams, rivers, groundwater, and oceans, or 2) is absorbed by plants and released into the atmosphere by transpiration, or 3) is used by animals and humans.

2. *Question: What are the sources of water?*
   Answer:
   - Although water covers approximately 70%of the earth, 97% of this water is made up of oceans. Because of its salt content, ocean water is not useful for agricultural, human, or industrial use. The salt is left behind when the water evaporates, but removing the salt is very expensive.
   - Surface water includes all lakes, ponds, and rivers. Surface water is the most important source of water for humans because it is readily available. It is also the easiest to pollute, in which case it becomes useless.
   - Groundwater is water in the earth's surface. This water is pumped to the surface by wells.

3. *Question: How is water used?*
   Answer:
   - agriculture: irrigation, livestock production
   - industry: processing of raw materials
   - hydroelectric plants: generate electricity
   - fish and wildlife: habitat
   - recreation: boating, fishing, skiing, sailing, swimming
   - domestic: cooking, cleaning, drinking (The U.S. population drinks nearly 100 million gallons of water per day.)

4. Question: *What are some threats to water quality?*
   Answer:
   a. Urban pollution
      - sewage
      - dumps and landfills
      - chemicals used on roadways

   b. Industrial pollution
      - thermal pollution: returning heated water to lakes and rivers disturbs the reproductive instincts of fish and also causes excess algae
      - radioactive waste: passed on to humans through seafood
      - organic waste: sewage requires oxygen for breakdown, so there is less oxygen in the water for fish
      - other contaminants: e.g., drugs, soaps, paints, fertilizers

   c. Agricultural pollution
      - disposal of waste and manure
      - pesticide and fertilizer
      - sediment runoff from erosion of topsoil

D. Conclusion
To maintain adequate water supplies, everyone must become more conscientious about its use and must employ methods of conservation. The current demand for water exceeds water supplies in some areas of the world.

E. Evaluation
A sample test is provided at the end of the duty area.

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Lesson 5.6 Methods of Conserving Water

Student Objective

List important water conservation practices.

References

Camp, William G., and Thomas B. Daugherty. *Managing Our Natural Resources*. Albany: Delmar, 1991.

Presentation

A. Introduction

Although the quantity of water on the earth's surface remains fairly constant, pollution can make it unusable. Water conservation practices are necessary to maintain the supply of clean water and to guarantee adequate water supplies in the future.

B. Motivation

Have students list industries in their community that use water.

C. Discussion

Question: What are some important water conservation practices?

Answers:

- Dams, ponds, and reservoirs: these methods have the advantages of reducing flooding, storing water for the future, providing recreation, producing power, and supplying water to people, agriculture, and industry. Their disadvantages are that they require a great deal of earth removal, they can be very expensive, and they completely change the terrain of a large area of land.
- Desalination (removal of salt from water): water covers approximately 70% of earth, and about 97% of this is salt water. Salt water is thus a huge untapped source of water. Unfortunately, desalination is very expensive. In addition, salt water only exists in coastal areas, so desalinated water must transported elsewhere for use.
- Use and reuse of water: reclaiming water that has already been used. For example, raw sewage can be refined into clean, potable (i.e., drinkable) water. Most industry is already required to reclaim the water used; it is also possible to collect runoff from urban areas for recycling.

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D. Conclusions
In order to maintain an adequate water supply today and for the future, we must plan how to most effectively use and reuse our water.

E. Evaluation
A sample test is provided at the end of the duty area.

Lesson 5.7 Home Water Conservation Techniques

Student Objectives

1. Explain where local water comes from.
2. List methods of conserving water in home use.

References

Be Water Wise. Blacksburg: Virginia Water Resources Research Center, 1988.

Lytle, R. A., and Harry B. Kircher. *Investigations in Conservation of Natural Resources*, 2nd ed. Danville: Interstate, 1993.

Equipment, Supplies, Materials

copies of handouts 6VA 5.3-5.5 (This survey may need to be adapted for local use.)

Presentation

A. Introduction

The first step in using water wisely is to conserve it in everyday life. Conserving water reduces waste, minimizes cleanup efforts, and saves money now spent on providing clean water. Conservation begins with individual efforts.

B. Motivation

Have students complete 6VA 5.3-5.5, the survey investigating sources of water (adapted, if necessary, for local use). Parts of it may be completed in class during the lesson.

C. Discussion

1. *Question: Where does local water come from?*

   Answer: a. Community or public water systems
   - It is pumped from a lake, river, or reservoir to the filtration plant.
   - It is strained to remove fish or other objects.
   - Chlorine is added to kill bacteria.
   - Chemicals are added to cause sediment to sink to the bottom.
   - Sand is filtered out.
   - It is treated with lime to adjust the pH.

- Fluorine may be added.
- The filtered water is stored until needed.

Used water is called *waste water.* It is carried back to the treatment plant by storm sewers, where it is retreated and discharged back into streams and rivers. If less water is used, then less of it has to treated and retreated.

b. Private wells: about 1/4 of all homes have private wells; they are prevalent in most rural areas and much of the West. The source of well water is groundwater, which is potable unless it has been polluted or contaminated. Septic systems remove waste water and soil is used as a natural filtration system. Waste that is not broken down remains in the septic tank and has to be cleaned out every few years.

2. *Question: What are some methods of conserving water at home?*
Answers: a. Laundry
   - Wash full loads of clothes. (35-60 gallons are used per load.)
   - Use smaller-load water setting, if available.

b. Shower and bathtub
   - Use the shower rather than the tub. (25 gallons are required for a half-full tub.)
   - Take shorter showers. (5-10 gallons are used per minute in the shower.)
   - Use flow restricters on the shower head and faucets.
   - For baths, fill the tub only 1/4 full.
   - Turn off faucets when not in use. (2-3 gallons go down the drain while brushing teeth.)

c. Toilets
   - Replace the old toilet with one designed to conserve water. (45% of all water used is for toilets: 4 gallons are used per flush.)
   - Place a brick or other object in the toilet tank to displace water and reduce the amount used in each flush.
   - Check for leaks and replace faulty parts.

d. Kitchen
   - Avoid letting water run while washing dishes.
   - Fix leaky faucets.
   - Collect cold water that runs while waiting for hot and save it for drinking or watering pets and plants.

e. Around the home
   - Water lawns in the early morning when there is less evaporation, but not in the evening because it can encourage grass diseases.
   - Use sprinklers that are low to the ground, such as soaker hoses, to prevent evaporation into the air.
   - Mulch around plants and in gardens to conserve moisture.
   - Conserve water when washing the car. (1000 gallons pass through a 3/4-inch hose in one hour.)
   - Collect rainwater and use it later to water plants, pets, etc.
   - Collect gray water and reuse it.

D. Conclusion
The water supply is unlimited if it is used wisely. Conservation reduces waste water, saves money, and extends the clean water supply.

E. Evaluation
A sample test is provided at the end of this duty area.

Lesson 5.8 The Interrelationship of Agriculture and the Environment

Student Objectives

1. Explain why agriculture is dependent on the environment.
2. Discuss how agriculture can harm the environment.
3. Discuss how agriculture can help the environment.

References

Camp, William G., and Thomas B. Daugherty. *Managing Our Natural Resources*. Albany: Delmar, 1991.

Cooper, Elmer. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.

Lytle, R. A., and Harry B. Kircher. *Investigations in Conservation of Natural Resources*. 2nd ed. Danville: Interstate, 1993.

Presentation

A. Introduction

Success in agriculture is determined largely by the quality of the environment: plants require uneroded topsoil; irrigation and livestock require water; wildlife must have habitat that ensures its survival. In the past, agriculture played a part in the destruction of the environment. Now, however, agriculture must work to protect it, because the world's resources are essential to survival.

B. Motivation

Walk with students around school grounds, and discuss the interrelationship between the school and the environment. A school pond is an ideal place to discuss these interactions.

C. Discussion

1. *Question: Why is agriculture dependent on the environment?*

   Answer: In order to produce food and fiber, agriculture needs soil that has not been eroded and water that is uncontaminated. As the population increases and the agricultural industry feeds and clothes more and more people, the importance of protecting the environment is greater than ever. To meet the demands of the future, natural resources must be managed well today.

2. *Question: How does agriculture harm the environment?*
   Answers:
   - It causes air pollution: e.g., by improper use of pesticides and fertilizers.
   - It causes water pollution: e.g., by not disposing of containers properly, and from animal waste, pesticides, fertilizers.
3. *Question: How can those in agriculture help the environment?*
   Answers:
   - Protect resources as agriculturists and citizens.
   - Prevent soil erosion.
   - Keep pesticides and fertilizers from contaminating soil and water.
   - Provide a habitat for wildlife.
   - Prevent livestock from grazing in forested areas.
   - Dispose of animal waste properly.
   - Use conservation tillage practices.

D. Conclusion

In order to produce food and fiber, the agriculture industry needs productive soil, clean water, unpolluted air, and natural resources that can produce energy. Animal and plant growth also requires minerals from the environment such as salt, nitrogen, phosphorus, and potassium. Agriculture cannot survive without a healthy environment.

E. Evaluation

A sample test is provided at the end of the duty area.

Duty Area 5 Evaluation
Introducing Ecology and Conservation

Name _____

Date _____

I. Multiple Choice: circle the best answer.

1. Organisms include:
   a. plants, animals, and water
   b. plants, water, and soil
   c. plants, humans, and animals
   d. soil, water, and wildlife

2. Ecology means:
   a. the relationship between living things and their environment
   b. taking care of our environment
   c. planning for resources in the future
   d. all of the above

3. Conservation means:
   a. the best use of a natural resource
   b. minimizing waste
   c. not using a natural resource at all
   d. both a and b

4. Most water for urban areas comes from:
   a. groundwater
   b. wells
   c. small creeks and streams
   d. lakes, rivers, and reservoirs

5. During the water treatment process:
   a. water is strained to remove fish
   b. chlorine and fluorine may be added
   c. water is pumped from rivers, lakes, or reservoirs
   d. all of the above

6. After water is used, it may be:
   a. retreated and stored for future use
   b. dumped into a river and carried away
   c. not used because it is polluted
   d. all of the above

7. Areas at home where water is used include:
   a. the bathroom
   b. the kitchen and laundry
   c. outside
   d. all of the above

8. The ocean is:
   a. the world's largest source of water
   b. not useful because of salt
   c. part of the water cycle
   d. all of the above

9. The source of water that is most useful to man is:
   a. the ocean
   b. groundwater
   c. rain water
   d. surface water

10. Dams, ponds, and reservoirs help conserve water by:
    a. cleaning it
    b. storing it for future use
    c. removing salt
    d. keeping the water cold

11. *Potable* means:
    a. the water is drinkable
    b. the water is undrinkable
    c. the soil has eroded
    d. the water needs to be purified

II. Short Answer: write your answer in the spaces provided.

12. List two methods of conserving water in each of the areas listed.

Hot water

_____

_____

Toilet

_____

_____

Showers and bath

_____

_____

Rest of the home

_____

_____

13. List three natural resources and explain the importance of each.
Example: Plants are part of the food chain.

_____

_____

_____

14. Draw the steps of the water cycle. Explain how water travels from place to place.

15. Explain how a rain forest can be considered an ecosystem.

16. Explain the difference between the terms exploitation and preservation as they relate to natural resources.

17. List three ways in which agriculture can pollute the environment.

_____

_____

_____

18. Describe how agriculture can help the environment.

III. Matching: write the correct letter in the space(s) provided

19. Match the method of conservation with the resource it conserves. Each resource has two correct answers.

Resource Conserved	Method Used to Conserve
____ ____ Wildlife	A. Prevent erosion
____ ____ Forests, plants	B. Control runoff
____ ____ Soil	C. Remove dead or diseased
____ ____ Water	D. Limit hunting
	E. Rotate crops
	F. Limit harvest
	G. Create refuges
	H. Use less, and reuse what is used

20. Match the resource with its availability in nature.

____ Plants/forests
____ Soil
____ Wildlife
____ Air
____ Energy
____ Minerals
____ Water

R= renewable
E = exhaustible
N = nonexhaustible

21. Match the resource with its characteristic from the list.

____ Plants/forests	A. covers 70% of the earth
____ Soil	B. part of photosynthetic process
____ Wildlife	C. all plant growth occurs in it
____ Air	D. examples are gold and iron
____ Energy	E. from plant and animal remains
____ Minerals	F. help cool the earth
____ Water	G. part of the food chain

IV. Fill in the blank: write your answer in the space provided.

22. Environment includes _____.
23. Agriculture uses water to _____.
24. The biggest user of water is _____.
25. The purpose of a hydroelectric plant or dam is to prevent erosion and _____.

26. Recreation uses water for _____ _____, _____, and _____ _____.
27. Runoff from farms that can pollute water includes _____ and _____.
28. The removal of salt from water is called _____.
29. Surface water covers _____ percent of the earth.

IV. Extra Credit

30. Describe a current event that illustrates the importance of protecting our environment.

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Duty Area 5 Evaluation: Answer Key

1. C
2. D
3. D
4. D
5. D
6. A
7. D
8. D
9. B
10. B
11. A
12. Answers will vary.
13. Answers will vary.
14. Answers will vary.
15. Answers will vary.
16. Answers will vary.
17. Answers will vary.
18. Answers will vary.
19. D, G
    C, F
    A, E
    B, H
20. R
    E
    R
    N
    E
    E
    N
21. F
    C
    G
    B
    E
    D
    A
22. everything an organism comes in contact with
23. produce plants and animals
24. domestic
25. generate electricity
26. boating, fishing, swimming (other answers are possible)
27. pesticides, fertilizer
28. desalination
29. 70
30. Extra credit: Answers will vary

Library Assignment Worksheet

Locate the following information for your resource. Each group member should be assigned a specific responsibility. The answer to each question should be at least one half page in length.

Name of Resource: _____

Person Responsible	Questions
	1. Where is this resource found in the environment?
	2. Is this a renewable, exhaustible, or non exhaustible resource? Explain why or why not.
	3. How is this resource used by man?
	4. How does this resource relate to agriculture or why is it important to agriculture?
	5. Are humans presently endangering this resource? How? Or what is the current availability of this resource?
	6. How does this resource relate to the other resources?
	7. List and describe briefly ten careers that would relate to this resource?
	8. List ten specific examples of products that come from this resource that are used by people.
	9. How can people better manage this resource?

Diagram courtesy of USDA's Natural Resources Conservation Service

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Getting Water to and from Our Homes

Name _____

Water Supply

A. Complete the following if the water for your home comes from a town or city well or through a water filtration system:

1. What is the source of your drinking water?

2. Where is the filtration plant (or well) located?

3. How far is the water filtration plant (or well) from your home?

4. As a project, find out about how many people are served by the system and how much water is used each day.
   a. Number of people served = _____
   b. Total gallons of water used per day = _____
   c. Now divide the total amount of water used per day by the number of people served. This equals the amount of water used per person per day.
      Amount of water used per person per day = _____

5. How much does the city or town charge its residents for water?

Note: From your family's water bill, figure out the average amount of water used each day. Divide this by the number of persons in your family. This answer equals the average amount of water used per person per day in your home. Compare your answer to the average used in your city or town.

Be Water Wise worksheets courtesy of the Virginia Water Resources Center.

Getting Water to and from Our Homes cont'd

B. Complete the following if the water for your home comes from a private well.

1. Draw a map of your home and yard on the back of this worksheet or on a separate sheet of paper, and mark the location of the well.

2. How deep is the well?

3. Has the well ever run dry?

_____No _____ Yes If Yes, when? _____

4. Has the water ever become unfit or unsafe to drink?

_____ No _____Yes If yes, why?

5. In the last five years, has the well water been checked to find out if it's safe to drink?

_____No _____ Yes

6. What is the source of energy for getting water out of the well?

Water Treatment

C. Complete the following if the wastewater from your home flows to a septic tank:

1. Draw a map of your home and yard on the back of this worksheet or on a separate sheet of paper, and mark the locations of the septic tank and drainfield.

2. How many gallons of sewage and wastewater does your septic tank hold?

Getting Water to and from Our Homes cont'd

3. Has the septic tank ever worked improperly?

_____No _____Yes If yes, what was the problem?

D. Complete the following if the waste water from your home flows to a treatment plant:

1. Where is the treatment plant located?

2. As a project, find out the following facts about your treatment system.
   a. What phases of treatment does the wastewater go through?

      _____ primary
      _____ secondary
      _____ trickling filter
      _____ tertiary or activated sludge

   b. About how many gallons of wastewater are treated each day?

   c. Where does the treated wastewater go after it leaves the plant?

   d. What does your community do with the sludge?

   e. How much does the city or town charge its residents for wastewater treatment?

Note: In most communities, residents are charged a sewer fee based on the amount of water delivered to the home, even though some of the water (such as that used on the lawn) does not flow to the treatment plant.

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DUTY AREA 6: OVERVIEW
Identifying Career Opportunities in Agriculture

- **Competencies/Tasks**
  - 6.1 Identify full-time career opportunities in agriculture in Virginia.
  - 6.2 Identify part-time career opportunities in agriculture in Virginia.
  - 6.3 Explain career opportunities in agribusiness.
  - 6.4 Determine the educational requirements for certain agricultural occupations.

- **Lessons**
  - 6.1/6.2 Career Opportunities in Virginia Agriculture
  - 6.3 Career Opportunities in Agribusiness
  - 6.4 Educational Requirements for Some Agricultural Occupations

- **Evaluation**

  Suggestions for evaluation appear at the end of each lesson. A sample quiz appears at the end of the duty area.

DUTY AREA 6
Identifying Career Opportunities in Agriculture

Lesson 6.1 Career Opportunities in Virginia Agriculture

Student Objectives

1. Identify five full-time career opportunities in Virginia agriculture.
2. Identify five part-time career opportunities in Virginia agriculture.

References

Cooper, Elmer L. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.
Virginia Agriculture in the Classroom. Richmond: Virginia Farm Bureau Federation.
Think About It. Alexandria: National FFA Organization.
Agriculture's New Professionals. Video. The FFA Video Collection. Alexandria: National FFA Organization.
Careers in Agriculture. Filmstrip. Urbana: College of Agriculture, University of Illinois.

Equipment, Supplies, Materials

TV/VCR
filmstrip projector
local *Yellow Pages* directories

Presentation

A. Introduction

Agriculture is America's largest employer: nearly 23 million people work in agriculture and related fields. Only 2% of these people are actually involved in farming. Agriculture in Virginia offers numerous job opportunities. The education required for these jobs varies. Some jobs require unskilled workers; others require skills gained in a high school education or on-the-job training. Still other jobs require technical or professional skills and college education.

B. Motivation (select one)

1. Distribute copies of local *Yellow Pages* to the class. Have students list all the jobs related to agriculture that they can find.
2. Have each student write down an agricultural career on a sheet of paper, then play

agricultural *Charades* by having students act out the agricultural career or job they chose.

C. Discussion

1. *Question: What role does agriculture play in Virginia's employment?*
   Answer: Jobs related to agriculture make up 20% of Virginia's job market.

2. *Question: What are the some agricultural careers available in Virginia?*
   Answers: Following are some of the many career areas in Virginia. Most career areas offer part-time jobs for students.

Forester	Farmer or farm helper
Logger	Aquaculturist
Herd manager	Game warden
Greenhouse operator	Extension agent
Soil conservationist	Veterinarian
Milker at a dairy	Veterinary assistant
Lumber yard worker	Parts clerk

   Suggested Activity: Ask students to name local people who work in these careers. Discuss the basic science skills required to work in each area. Invite resource people from the community to speak to the class.

D. Other Activities

Have students select some career in agriculture, and present a report on it to the class. The *FFA New Horizons* magazine is an excellent reference for career descriptions.

E. Conclusion

Agriculture offers a number of satisfying careers, and because of the wide diversity of skills needed, everyone can find a place in agriculture. Nationally, more than 20% of America's work force is employed in occupations related to agriculture.

F. Evaluation

A sample test is provided at the end of this duty area. Students could also be evaluated on their class reports.

Lesson 6.2 Career Opportunities in Agribusiness

Student Objectives

1. Define *agribusiness*.
2. Discuss the relationship between agribusiness and agriculture.
3. List five careers in agribusiness.

References

FFA Student Handbook. Alexandria: National FFA Supply Service, latest edition.

Roy, Ewell, P. *Exploring Agribusiness*. 3rd ed. Danville: Interstate, 1991.

Smith, Marcella, Jean M. Underwood, and Mark Bultmann. *Careers in Agribusiness and Industry*. 4th ed. Danville: Interstate, 1991.

Think About It. Alexandria: National FFA Organization.

Virginia VIEW Career Hunt. Blacksburg: Virginia Tech, Virginia VIEW Career Information Delivery System by VOICC.

Equipment, Supplies, Materials

Virginia VIEW Career Hunt (Guidance department should have a copy.)

Presentation

A. Introduction

Earlier lessons demonstrated that agriculture is more than just farming: it is a complex system of related professions that provides food and fiber for the world. Farmers grow the raw materials needed, but they lack the resources to make these raw materials into consumer products. Instead, a whole industry of businesses has developed to get agricultural products from the farm to the home.

B. Motivation

Distribute copies of *Virginia VIEW*. Have students look through the various job descriptions and list those that are related to agriculture.

C. Discussion

1. *Question: What is* agribusiness?

   Answer: *Agribusiness* is the industry that produces, processes, distributes, and markets agricultural products.

2. *Question: Why is agribusiness important?*
   Answer: In Virginia, agribusiness adds more than $20 billion to the state's economy.

3. *Question: What services does agribusiness provide for agriculture?*
   Answer:
   - It provides equipment and materials to increase the quality and quantity of products.
   - It provides avenues for farmers to market their products.
   - It provides trained specialists such as veterinarians, extension agents, and soil conservationists.

4. *Question: What are the major career areas in agriculture?*
   Answer:
   - marketing, merchandising and sales
   - science and engineering
   - managers and financial specialists
   - social service professionals
   - education and communication specialist
   - agricultural production specialists

   Describe actual jobs available in each of these areas.

D. Conclusion
There are numerous careers available in the agribusiness industry, and many do not require a background in farming. To learn more about these careers, students can get involved in agriscience education or the FFA.

E. Evaluation
A sample test is provided at the end of this duty area.

Lesson 6.3 Educational Requirements for Some Agricultural Occupations

Student Objectives

1. Explain the difference between a job, occupation, and career.
2. List the major career areas in agriculture.
3. Match careers with educational requirements.

References

Cooper, Elmer L. *Agricultural Mechanics: Fundamentals and Applications*. Albany: Delmar, 1987.

Cooper, Elmer L. *Agriscience: Fundamentals and Applications*. Albany: Delmar, 1990.

FFA Student Handbook. Alexandria: National FFA Organization, latest edition.

Smith, Marcella, Jean M. Underwood, and Mark Bultmann. *Careers in Agribusiness and Industry*. 4th ed. Danville: Interstate, 1991.

Equipment, Supplies, Materials

list of salary averages for agriculturally related jobs
Virginia VIEW Career Hunt

Presentation

A. Introduction
Job opportunities in agriculture require various levels of education. This lesson examines several occupations in agriculture, and determines the education required to work in each.

B. Motivation
Have students scan the *Virginia VIEW* magazine and select at least one agriculture- related occupation that interests them. Discuss students' selections in class, focusing on the skills needed for employment (i.e., science, mathematics, communication, etc.).

C. Assignment
1. After covering the information in the first question of the *Discussion* section, have students list their parents' careers, occupations, and jobs.
2. Have students prepare a report on a career they find interesting. The report should

include a description of the work, the employment outlook in the field, the wage/salary scale, the education or training required, the location of educational facilities, and related jobs in the area.

D. Discussion

1. *Question: What is the difference between a job, occupation, and career?*
   Answer: A *career* is defined as an individual's profession or calling, whereas an *occupation* is defined as what a person does to make a living. A *job* is defined as the specific task a person does. For instance, an agricultural education teacher's career is education. Being a teacher is an occupation, and being an agriculture teacher at a particular school is a job.

   Select other well-known individuals in the community, and have students list the career, occupation and job of each person.

2. *Question: What educational training is needed for careers related to agriculture?*
   Answer:
   - Marketing, merchandising and sales: high school vocational courses, private career schools, community college, university
   - Science and engineering: college education; technicians can qualify with a community college degree
   - Managers and financial specialists: high school diploma, on-the-job training, career school, community college
   - Social service professionals: 2-year or 4-year college, depending on job description
   - Education and communication specialist: community college and college, on-the-job training, private career school
   - Agricultural production specialist: high school vocational courses, high school diploma, on-the-job training, private career schools, community colleges, university

3. *Question: What are the minimum educational requirements for some careers in agriculture?*
   Answers:
   - Agriculture teacher ..... 4-year degree
   - Farm helper ..... on-the-job training
   - Farm loan officer ..... high school diploma
   - Park ranger ..... on-the-job-training
   - Veterinarian ..... doctoral degree

   Use available references to add to this list.

E. Conclusion

Agriculture and agribusiness are huge industries. Together, they hold assets worth nearly a trillion dollars. Because of the size and strength of these related industries, they can offer a wide variety of job opportunities. In general, the more technical the career, the more education is required for employment in it.

F. Evaluation

A sample test is provided at the end of this duty area.

Duty Area 6 Evaluation
Identifying Career Opportunities in Agriculture

Name _____

Date _____

I. True or False: circle the correct letter.

T F 1. Farming involves 2% of the population of the U. S.

T F 2. Virginia agriculture offers a large variety of career opportunities.

T F 3. Jobs in agriculture require a college degree.

T F 4. Agriculture- -related jobs make up 20% of Virginia's job market.

T F 5. Agribusinesses don't play a major part in the agricultural industry.

T F 6. A job is defined as a person's calling.

T F 7. Your job is being a student at this school.

T F 8. It is possible to have several jobs throughout a lifetime.

T F 9. On-the-job training is one way to acquire work skills.

T F 10. The *Virginia VIEW* is a scenic magazine for Virginia.

II. Matching: match the level of education required with the occupation.

_____ 11. Agriculture teacher

_____ 12. Greenhouse worker

_____ 13. Farm loan officer

_____ 14. Park ranger

_____ 15. Veterinary assistant

a. On-the-job training

b. Community college

c. High school diploma

d. 4-year degree

e. Vocational class

III. Short answer: write your answer in the space provided.

16. Define the term *agribusiness.*

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17. List two jobs in the social service profession.

_____

_____

18. Explain why a career in agriculture is important.

19. Name a service provided by agriculture.

20. List five agricultural careers in this area.

_____

_____

_____

_____

_____

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Duty Area 6 Evaluation Answer Key

1. T
2. T
3. F
4. T
5. F
6. F
7. T
8. T
9. T
10. F
11. D
12. E
13. C
14. A
15. B
16. It is the industry involved with the production, processing, distribution and marketing of agricultural products.
17. Answers will vary.
18. Answers will vary.
19. Answers will vary.
20. Answers will vary.

In accordance with the requirements of the Office of Gender Equity for Career Development, Virginia Department of Education, the Carl Perkins Act, and other federal and state laws and regulations, this document has been reviewed to ensure that it does not reflect stereotypes based on sex, race, or national origin.

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